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MEDICINAL PLANTS

BEING

DESCRIPTIONS WITH ORIGINAL FIGURES

OF THE

PRINCIPAL PLANTS EMPLOYED IN MEDICINE

AND AN ACCOUNT OF THE

CHARACTERS, PROPERTIES, AND USES OF THEIR PARTS AND PRODUCTS OF MEDICINAL VALUE.

BY

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AND

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THE PLATES BY DAVID BLAIR, F.L.S.

IN FOUR VOLUMES

VOL. III (Nos. 147—227)

COMPOSITÆ TO THYMELACEÆ

LONDON

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1880

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D.Blair FLS ad nat. del. et lith.

M& N. Hanhart imp.

EUPATORIUM PERFOLIATUM. *Linn.*

N. Ord. Compositæ. Lindl. Veg. Kingd., p. 702 (*Asteraceæ*); Le Maout & Dec., p. 495.

Tribe *Eupatorieæ*.

Genus Eupatorium,* *Linn.* B. & H., Gen., ii, p. 245. Species over 400, natives chiefly of the warmer regions of America.

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147. Eupatorium perfoliatum, *Linn., Sp. Plant., ed.* 1, *p.* 838 (1753).

Boneset or *Bonsett. Thoroughwort. Crosswort.*

Syn.—E. connatum, *Michaux.* E. salviæfolium, *Sims in Bot. Mag.*, non *H. B. K.*

Figures.—Barton, t. 37; Bigelow, t. 2; Bot. Mag., t. 2010.

Description.—A perennial herb with an erect, stout, cylindrical, hairy stem 2—4 feet high, branched at the top. Leaves large, the lower 4—8 inches long, the upper much smaller, opposite, sessile, completely connate, dilated and 1—2 inches wide at the base, gradually tapering to the acute apex, rather finely serrate at the margin, smooth and dark green above, much wrinkled with veins, paler and closely downy beneath. Heads stalked, numerous, rather small, arranged in rather dense opposite-branched cymes from the axils of the upper leaves and ends of the branches, the whole forming a very large, slightly convex, cymose inflorescence, bracts small, linear, and like the branches hairy; involucre campanulate, the scales lanceolate, imbricate in several rows, acute, hairy; receptacle nearly flat, smooth. Flowers all bisexual, 10—20 or more in a head; corolla tubular, suddenly dilated above, with 5 broadly triangular teeth; anthers syngenesious, included in the corolla, without tails at the base, broadly apiculate; ovary inferior, 1-celled, with a single ovule; style filiform, stigmatic branches very long, wholly exserted, spreading, linear, blunt. Fruit (achene, cypsela) small, oblong, linear, smooth, bluntly 5-angled, crowned by a sessile pappus of a single row of rough

* *Eupatorium*, εὐπατόριον of Dioscorides, originally applied to *Agrimonia Eupatorium*, Linn.

spreading hairs. Seed solitary, erect, filling the fruit, no endosperm.

Habitat.—A very common and familiar plant in low meadows and damp ground in North America, extending through a wide extent of country from Nova Scotia to Florida and flowering from July to September. There is considerable variety in size, amount of hairiness, form of leaves and inflorescence; the upper leaves are frequently not connate and sometimes alternate.

The connate leaves are remarkable in having a vein or rib running along the line of union, giving completely the appearance of a single leaf with 4 ribs radiating from the centre through which the stem passes.

This species is in cultivation in the botanic gardens at Edinburgh.

A. Gray, Man. Bot. U. States, p. 226; Hook., Fl. Bor.-Amer., i, p. 305; DC. Prod., v, p. 151; Lindl., Med. Bot., p. 451.

Official Parts and Name.—EUPATORIUM; the leaves and tops gathered after flowering has commenced (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—The common names of the official Eupatorium of the U. S. P. are *Thoroughwort* and *Boneset*. It is kept in the shops in two forms, that is, either in bunches; or in small oblong packages, in which it is much broken up. In the former state Wood describes it as distinguishable "by its perfoliate and decussating leaves, and by its flattish dense summit of white, almost feathery flowers." The botanical characters, however, as given by us, should be carefully noticed, as otherwise it may be readily confounded with other nearly allied plants. Eupatorium has a feeble odour, and a strongly bitter, peculiar taste.

It has been analysed by Mr. W. Peterson, of the United States, and found to contain a peculiar *bitter principle*, *resin*, a *crystalline matter*, *gum*, *tannic acid*, *extractive*, *salts*, and some other unimportant substances. Mr. Bickley also found a trace of *volatile oil*, *albumen*, and *gallic acid*. Wood has proposed the name of

eupatorin, for the bitter principle after it has been satisfactorily isolated and examined, but this name is as yet premature. The so-called *eupatorin* (*perfo.*) of the eclectic practitioners in the United States, is a complex substance. The virtues of thoroughwort are yielded both to water and alcohol.

Medical Properties and Uses.—Thoroughwort was a favourite medicine of the Indians of North America; it has always been a popular remedy in the United States, and at the present time it is in use to some extent in regular practice. It is regarded as a mild tonic in moderate doses, and also diaphoretic, more especially when taken in the form of a warm infusion; and in large doses it is emetic and purgative. In some cases it is said to act as a diuretic. It has also been much esteemed as a popular febrifuge, but although its employment in intermittent and other fevers has frequently been attended with success in the hands of the physician; still, it is said by Dr. Wood "to be greatly inferior to sulphate of quinia in certainty, while, in its effects as thus used, it is much more disagreeable. It may be very appropriately tried in obstinate and frequently recurring attacks of intermittent fever, in which quinia has become offensive to the patient, or inoperative from repetition. The same remarks are applicable to its comparative efficacy in remittents; in which, however, its tendency to produce perspiration is somewhat in its favour." It has also been employed, but with doubtful advantage, in typhoid and yellow fevers. As a mild tonic it is useful in dyspepsia, general debility, and in other cases where such remedies are required; it is reputed to be peculiarly serviceable in the indigestion of old people. It has likewise been used in acute rheumatism, obstinate cutaneous diseases, and dropsy, but the experience of the profession is not now favorable to its employment in such cases. As a remedy in catarrh, and more especially in influenza, it has been extensively used, and with the best effects. When given in the form of a warm infusion at the commencement of catarrh, so as to produce profuse perspiration and sometimes vomiting, it will frequently, it is said, arrest that complaint; and when used in the treatment of influenza it should also be administered in the form of an infusion

made in the proportion of an ounce to sixteen ounces of boiling water; and in doses of a wineglassful, to be drunk warm every half hour, the patient remaining in bed the whole time. After four or five doses profuse perspiration, and sometimes vomiting, is produced, when relief is at once obtained; after which the medicine should be given in small and repeated doses so as not to nauseate. Dr. Chapman states that the popular name of *boneset* is derived from the great value of this remedy in the treatment of a species of influenza which had much prevailed in the United States, and which from the pain attending it was commonly denominated *break-bone fever*. As a remedy in influenza it is well worthy of a trial in this country. The so-called *eupatorin* (*perfo.*) is the form in which this remedy is principally employed by the eclectic practitioners in the United States.

Other Medicinal Species of Eupatorium. — Various other species of Eupatorium are reputed to be of medicinal value in the United States and other parts of the world, as *Eupatorium purpureum* or *gravel root*, for its tonic, astringent, and diuretic properties; and *E. teucrifolium* or *wild horehound*, which has similar, although less powerful properties than the official species. Both these plants were formerly included in the Secondary List of the Materia Medica of the U. S. P. *E. ageratoides* or *white snake-root*, is also in use as an antispasmodic, diuretic, and diaphoretic; it is this plant which has been supposed to cause the fatal disease called "trembles" in cattle, and the equally fatal local disease of some of the Western States, called "milk sickness" in the human subject. *E. aromaticum* and *E. incarnatum* are also other American species which have gained much reputation in diseases connected with inflammation and irritability of the bladder; they are said to contain a principle similar to, if not identical with, coumarin. The leaves of *Eupatorium glutinosum* also constitute one of the substances known as matico in South America, and which are employed as styptics; but the official matico is derived from *Piper angustifolium*, as is noticed in our description of that plant. *E. cannabinum* was formerly in use in Europe as a purgative, and for other purposes; *E. Ayapana*, a

South American species, is an aromatic bitter like *E. perfoliatum*, and is extensively used as an antidote to the bites of venomous reptiles. *E. nervosum*, a Jamaica species, commonly known by the name of *bitter-bush*, is regarded as very efficacious in cholera, and also in typhus and typhoid fevers, and in smallpox; it is also reputed to be a good cholagogue.

U. S. Disp., by W. & B., p. 388; Wood's Therapeutics and Pharmacology, p. 297; Porcher's Resources of the Southern Fields and Forests of the United States; Pharmacopœia of India, p. 127; Grover Coe's Concentrated Organic Medicines, New York, pp. 329—333; Amer. Journ. Pharm., vol. xxiii, p. 210, and vol. xxvi, p. 495; Brit. Pharm. Journ., vol. viii, ser. 2, p. 222; Bigelow, American Eupatoria, Pharm. Journ., ser. 3, vol. v, p. 303, and Year Book of Pharmacy for 1875, p. 194; Jackson, Notes on some Medicinal Plants of the Compositæ, Pharm. Journ., vol. vi, ser. 3, p. 462; and various notices in Proc. Amer. Pharm. Assoc., vols. vii, viii, x, xv, xvi, &c.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected in Ohio.

1. Upper part of a flowering stem.
2. A head.
3. Section of the same.
4. A flower.
5. An anther.
6. Fruit.
7. Part of a hair of the pappus.

(2–7 enlarged.)

D.Blair F.L.S ad sicc. del

M&N.Hanhart imp.

ERIGERON HETEROPHYLLUM, *Muhl.*

N. Ord. COMPOSITÆ.

Tribe *Asteroideæ*.

Genus Erigeron,* *Linn.* B. & H., Gen., ii, p. 279. Species about 100, natives chiefly of temperate and mountain regions of both Old and New Worlds.

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148. Erigeron heterophyllum, *Mühlenb., in Willd., Sp. Plant.*, iii, *p.* 1956 (1800).

Daisy Fleabane. Sweet Scabious.

Syn.—E. annuum, *Pers.* E. strigosum, *Bigel.* non *Muhl.* Aster annuus, *Linn.* Stenactis annua, *Nees.* Diplopappus annuus, *Reichenb.* Phalacroloma acutifolium, *Cass.* Pulicaria bellidiflora, *Wallr.*

Figures.—Barton, i, t. 21; Fl. Danica, t. 486; Nees, Gen. Fl. Germ.; Reichenb., Ic. Flor. Germ., xvi, t. 912.

Description.—Biennial or (?) annual, with a short, stout, ovate, oblique root. Stem erect, 2—4 feet high, simple, solid, cylindrical, striate or angular, corymbosely branched at the top, more or less hispid with spreading hairs. Lower leaves long-stalked, ovate, acute, tapering into the bordered petiole, with a few large crenate serrations, the upper ovate-oblong or -lanceolate, often sessile, entire, all usually somewhat hispid. Heads numerous, erect, about ½ inch wide, scales of the involucre numerous, equal, in two rows, lanceolate-strap-shaped, acute, broadly scarious and slightly denticulate at the margins, hairy on the back, pale green, receptacle convex without scales. Disk flowers numerous, bisexual, corolla tubular, somewhat enlarged above, with 5 erect short teeth, yellow, anthers included, not tailed at the base, the connective prolonged into a point, stigmatic branches compressed, oblong. Ray-flowers female, numerous, corolla-limb linear, strap-shaped, narrow, with 2 or 3 minute teeth, white or purplish. Fruit compressed, without ribs, slightly hairy, crowned by a

* *Erigeron*, ἠριγέρων, in Latin *Senecio*, the classical names of the groundsel or some allied plant; from the falling off of the white pappus and resulting bald head suggesting the rapid approach of old age.

double pappus, the inner row of long hairs (absent in the ray-flowers), the outer of very short ones.

Habitat.—A very common weed in North America, being found on waste ground and roadsides throughout Canada and the United States to Kentucky, flowering from May to August. Introduced accidentally into Europe more than a century ago it has spread widely, and is now common in many parts of the Continent, as the Rhine districts of Germany and in North Italy, having the appearance of a wild plant. It has not established itself in England; but is grown in the gardens of Kew and Glasnevin. There is considerable variation in habit and in the amount of hairiness of stem and leaves.

E. philadelphicum, L., another common American species, is perennial, with the upper leaves stem-clasping, and the very numerous narrow ray-flowers rose-coloured; it is figured in Barton, t. 30.

DC. Prod., v, p. 298; A. Gray, Man. Bot. N. U. States, p. 237; Hook., Fl. Bor.-Americana, ii, p. 20; Koch, Deutschlands Flora, ed. 2, i, p. 387; DC. Géogr. Bot., p. 727; Lindl., Fl. Med., p. 454.

Official Part and Name.—Erigeron; the leaves and tops of Erigeron heterophyllum, and of Erigeron philadelphicum (U. S. P.). Erigeron, or Fleabane as it is also termed in the Pharmacopœia of the United States, is not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—These two official species are said to be identical in their medical properties, and are therefore employed indiscriminately in the United States. In the neighbourhood of Philadelphia they are commonly, although improperly, known under the name of *Scabious*. When required for medicinal purposes, they should be gathered soon after the commencement of the flowering stage, at which period they have a feebly aromatic odour and bitterish taste. Their virtues are imparted to boiling water.

Their properties are principally due to the presence of a *volatile oil*, which exists, however, in but very small proportion; thus

forty-five pounds of the herb of *Erigeron philadelphicum* only yielded Mr. F. L. John, half a drachm of the oil. According to Professor Procter, this oil has a greenish-yellow colour; a bitterish, disagreeable, pungent taste; and a penetrating, powerful, aromatic odour. Its specific gravity is 0·946; it is stated to be more viscid, and to contain more oxygen than the official oil of *Erigeron canadense*, which is described under the plant yielding it.

Medical Properties and Uses.—Fleabane possesses diuretic properties, and, according to Wood, both species "lie well upon the stomach, and are sometimes received kindly, when other more efficient diuretics are rejected." Various practitioners of repute in the United States have spoken favourably of fleabane as a remedy in gravel and other diseases of the kidneys. It has also been found useful in dropsy, but in this disease it should only be employed in conjunction with other more powerful medicines. In hydrothorax complicated with gout it has likewise been recommended. The best form of administration is the infusion, which may be prepared by macerating an ounce of fleabane in a pint of boiling water; and this may be given, when cold, to the amount of a pint daily.

The oil of Philadelphia fleabane has also been reputed to be a valuable remedy in uterine hæmorrhage, but it would appear that the oil thus used was not that of *Erigeron philadelphicum*, but that of *E. canadense*. The remedial virtues of this latter oil will therefore be alluded to under the name of the plant from which it is derived.

U. S. Disp., by W. & B., p. 385; Wood, Therap. & Pharm., vol. ii, p. 590; Stillé, Therap., & Mat. Med., vol. ii, p. 540; Procter, Amer. Journ. of Pharm., vol. xxvii, p. 105.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected by Wirtgen, near Coblentz. 1. The whole plant, divided. 2. An involucral scale. 3. Section of a head of flowers. 4. Disk-flower. 5. Ray-flower. 6. Stigmas. 7. An anther. (2–7 enlarged.)

ERIGERON CANADENSE, *Linn.*

W. Blair F.L.S. ad nat. del. et lith.

M & N Hanhart imp.

N. Ord. Compositæ.
Tribe *Asteroideæ*.
Genus **Erigeron**, *Linn.*

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149. Erigeron canadense, *Linn., Sp. Plant., ed.* 1, *p.* 863 (1753).

Horse weed, Butter weed, Canada Fleabane (United States).

Figures.—Syme, E. Bot., v, t. 773 (bad); Reichenb., Ic. Fl. Germ., xvi, t. 917; Flora Danica, t. 1274.

Description.—An annual (or biennial?) herb. Stem simple, erect, 2—4 feet high, stiff, slender, pale green, striate, more or less rough with scattered spreading hairs; branches mostly in the upper part, numerous, short, slender, ascending. Radical leaves forming a rosette, spathulate or narrowly obovate, with a few deep large teeth, soon withering; stem-leaves numerous, alternate, sessile, linear or the lower ones linear-lanceolate, tapering at both ends, acute, entire or with few scattered irregular shallow teeth, thin, glabrous above, sparsely hairy and with a prominent midrib beneath, ciliate on the margin with short incurved bristly hairs. Heads very numerous, shortly stalked, very small, about $\frac{1}{4}$ inch long, and less in diameter; corymboso-racemosely arranged on the branches, which form collectively a loose, broadly oblong, blunt, cylindrical, terminal inflorescence; involucre of three irregular rows of linear acute glabrous or slightly hispid scales, the innermost erect, with broadly scarious margins, the outer shorter, slightly spreading, all reflexed in fruit, receptacle flat or slightly convex, pitted. Disk-flowers minute, very numerous, bisexual; corolla tubular, with very short teeth, pale dirty greenish yellow; anthers half-exserted, not tailed at the base, but with the connective prolonged into a tongue at the apex; stigma with short branches. Ray-flowers numerous, female, crowded in a single row; corolla-limb very short, erect, 2-toothed, very pale violet-white, stigmatic branches spreading. Fruit small, oblong, compressed, without ribs, yellowish-grey, with scattered short,

adpressed bristly hairs; pappus sessile, of one row of about twenty simple, horizontally spreading, rough, pale-yellowish hairs.

Habitat.—Throughout the temperate and warmer regions of the world there are probably very few countries where this weed is not found, but it has not been recorded from tropical Africa, though it occurs at the Cape. It is common throughout Europe and the Mediterranean countries, extending through the western provinces of Asia to India and further eastwards to China, &c. It also occurs in many of the Pacific islands. Its abundance in these parts has led to the supposition that it is native to the Old World; but there are abundant reasons for believing that it is of American origin, and has spread over the remainder of the globe since its importation from that continent. At the present day its range in the New World extends from Canada to the Argentine Republic, and includes also the West Indies, Bermuda, &c.

The history of its introduction into Europe is as follows. Parkinson, in 1640, seems to be the first author who mentions the plant, but he describes it as an American species only. It appears, however, in a list of the contents of the Botanic Gardens of Paris, published in 1653, and a few years afterwards it had become a weed about Paris. It had been previously quite unknown to the French botanists, and several accounts of its mode of introduction were given, as that the seeds were imported with beaver-skins or a stuffed bird-skin from Canada. In England the first record for it is in 1669, but as it was then stated to be frequent, no doubt it had been imported some years previously. It has never become very common in this country, and at the present day is chiefly to be met with in and about London, and for a short distance up the valley of the Thames. Here it is very abundant on newly disturbed waste sandy or gravelly soil, flowering in August and September. In the rest of England it is of rare and casual occurence, and it has no vernacular English name.

There is, as might be expected in a plant ranging so widely, considerable variety in the size and habit of specimens from different countries.

Park., Theat. Bot., p. 595; Boccone, Plant. Sic. Rar., p. 85 Morison, Prælud. Bot., i, p. 256; Syme, E. Bot, v, p. 107 Hook. f., Stud. Fl., p. 196; Watson, Comp. Cyb. Brit., p. 533; Trimen & Dyer, Fl. Middlesex, p. 149; DC. Prod., v, p. 289; A. Gray, Man. Bot. N. U. States, p. 236; Hook., Fl. Bor.-Amer., ii, p. 20; Harvey, Fl. Capensis, iii, p. 86; Gren. & Godr., Fl. France, ii, p. 96; DC. Géogr. Bot., p. 726; Boiss., Fl. Orient., iii, p. 163.

Official Parts and Names.—Erigeron Canadense; the leaves and tops (U. S. P.). It is commonly distinguished in the United States from the other official *Erigeron* described by us under *Erigeron heterophyllum,* by the name of Canada Fleabane. It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

Collection, General Characters, and Composition.—For medicinal use the plant should be collected while in flower. The leaves and flowers are regarded as the most active parts. Canada Fleabane has an agreeable aromatic odour, more especially when bruised, and a somewhat astringent, bitterish, feebly acrid taste. In these properties it resembles the other official Fleabane, but in Canada Fleabane they are more evident.

Examined by Dr. De Puy, it was found to contain *bitter extractive, tannic* and *gallic acids, volatile oil,* and other unimportant substances. Its medical properties are imparted both to alcohol and water; but its properties are injured by boiling in consequence of the loss of volatile oil.

Oil of Canada Fleabane is official in the Pharmacopœia of the United States. It is described by Professor Procter as having a specific gravity of 0·845, a light straw colour, peculiar aromatic persistent odour, and a mild characteristic taste. It is composed of carbon, hydrogen, and oxygen, and appears to consist of two distinct oils; and, as is noticed in our description of the oil obtained from the other official *Erigeron,* it is stated to contain more oxygen, and to be more viscid, than it.

Medical Properties and Uses.—Canada fleabane is said to possess tonic and astringent qualities in addition to the diuretic property which is the more especial characteristic of the other official fleabane.

Thus, Stillé states that "almost all of the testimony which has been published respecting the remedial virtues of fleabane agree in attributing to the Canadian species astringent and hæmostatic virtues, and to the Philadelphia species a diuretic action, more particularly." It has been found a useful remedy in the treatment of diarrhœa, dysentery, and dropsical complaints. The best forms of administration are said to be the official fluid extract of the Pharmacopœia of the United States; or an infusion prepared by macerating an ounce of the plant in a pint of boiling water. The dose of the extract is from five to ten grains, and that of the infusion a wineglassful or more; the dose of each to be repeated every two or three hours.

The oil of Canada fleabane was first introduced into notice by the Eclectic physicians, who had found it useful in diarrhœa and various hæmorrhages. More recent trials seem to indicate that it is a remedy of more especial value in uterine hæmorrhage. The dose is from five to ten drops every two hours. It has also been recommended in doses of ten drops in gonorrhœa. It is also employed by the Eclectic practitioners when dissolved in alcohol, in the proportion of one drachm of the oil to from one to two ounces of alcohol, as an application to inflamed and enlarged tonsils, in inflammation and ulceration of the throat generally, and also in other local inflammations. It is said to be a most valuable remedy in such cases.

U. S. Disp., by W. & B., pp. 386 and 1306; Wood, Therap. & Pharm., vol. ii, p. 590; Stillé, Therap. & Mat. Med., vol. ii, p. 540; Grover, Coe, Concentrated Organic Medicines, p. 261; Procter, Amer. Journ. of Pharm., vol. xxvi, p. 502; John, Amer. Journ. of Pharm., vol. xxvii, p. 105; Amer. Journ. of Med. Sci., Oct., 1865, p. 396; Proc. Amer. Pharm. Assoc., vol. xiv (1866), p. 161.

DESCRIPTION OF PLATE.

Drawn from a specimen collected at Charing Cross, London. 1. Whole plant, $\frac{1}{12}$ nat. size. 2. Upper part of a smaller specimen. 3. A flower-head. 4. Section of the same. 5. A disk flower. 6. A ray flower. 7. A scale of the involucre. 8. A stamen. 9, 10. Fruit. 11. A leaf from the radical rosette. (3–8 and 10 enlarged.)

INULA HELENIUM, *Linn.*

N. Ord. Compositæ.

Tribe *Inuloideæ*.

Genus Inula,* *Linn.* B. & H., Gen., ii, p. 330. Species 56, natives of Europe, Africa, and Asia, chiefly in temperate countries.

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150. Inula Helenium, *Linn., Sp. Plant., ed.* 1, *p.* 881 (1753).

Elecampane.

Syn.—Corvisartia Helenium, *Merat.*

Figures.—Woodville, t. 26; Hayne, vi, t. 45; Steph. & Ch., t. 49; Nees, t. 240; Berg & Sch., t. 22 f.; Syme, E. Bot., v, t. 766; Reichenbach, Ic. Fl. Germ., xvi, t. 921.

Description.—A perennial herb with a large, somewhat flat, many-headed rootstock, very thick and fleshy, extending below into a fusiform root with thick succulent branches. Stem reaching 5 feet high, usually about 3 feet, erect, thick, striate, solid, shortly hairy or woolly, corymbosely branched at the top. Root-leaves very large, long-stalked, about 18 inches long, oblong-oval, tapering at both ends and much attenuate and decurrent along the petiole; stem-leaves sessile, or nearly so, ovate acute, the upper ones amplexicaul; all finely and rather irregularly serrate-dentate, smooth and green above, veiny, greyish and shortly but densely woolly beneath. Heads very large, solitary, terminating the branches, 2½ inches or more wide; involucral scales imbricated in several rows, erect, the outer ones very large and leaflike, broadly oval, with the points recurved, the inner ones narrower, thickly downy outside, and with ciliated margins, the innermost linear, acuminate, glabrous; receptacle broad, nearly flat, naked, with a shallow excavation for each flower. Disk-flowers very numerous, bisexual; corolla tubular, slightly wider upwards, 5-toothed, yellow; anthers with long rough tails at the base; stigmas bifid,

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* *Inula*, a Latin classical name for the plant, and perhaps a contraction of the word *Helenium*, ἑλένιον, which was applied to the same species. By the mediæval writers it was written *Enula*. Elecampane is a corruption of the ante-Linnæan name, *Enula campana*.

the upper surfaces of the branches papillose. Ray-flowers female, numerous, in a single row; corolla ligulate, nearly an inch long, spreading, narrowly linear, 3-toothed at the apex, yellow. Fruit $\frac{1}{6}$ inch long, smooth, pale brown, somewhat compressed, 4-ribbed, pappus long, whitish, hairs rough, in a single row, spreading.

Habitat.—Elecampane is a widely distributed though scarcely a common plant in England, occurring in damp pastures and shady ground; it lies under the suspicion of alien origin here in consequence of its having been formerly much cultivated by country people, but is probably truly a native plant in southern England, though considered certainly introduced into Scotland. Elsewhere it has a wide distribution through all central and south Europe, and it extends eastwards as far as S. Siberia and N. W. India.

It flowers in July and August, and is a striking and handsome plant. After the flowers have fallen, the involucral scales spread horizontally and the removal of the fruit shows the beautifully regular arrangement of the little pits on the receptacle which form a pattern, like the engine-turning of a watch.

Syme, E. Bot., v, p. 97; Hook. f., Stud. Fl., p. 198; Watson, Comp. Cyb. Br., p. 232; Koch, Fl. Germ., p. 392; Lindl., Fl. Med., p. 456.

Official Part and Name.—Inula; the root (U. S. P. *Secondary*). It is not official in the British Pharmacopœia, or the Pharmacopœia of India; but it was formerly official in the London and Dublin Pharmacopœias.

Collection and Preparation.—When required for medicinal use, the roots are obtained from plants two or three years old, those of older growth being too woody. The larger portions are then variously sliced both transversely and longitudinally, and dried; while the smaller portions are dried entire.

General Characters and Composition.—The dried root, as seen in commerce, essentially consists of transverse or longitudinal slices, which are variously twisted or curled from the contraction they have undergone in the process of drying; and mixed with

these may frequently be seen smaller pieces of the entire root of various lengths. The pieces have a brownish colour externally, and are yellowish-grey internally; they have a somewhat horny character, and break with a close smooth fracture. Elecampane root has at first a somewhat glutinous taste, but by chewing it becomes subsequently aromatic, and slightly bitter and pungent; it has an agreeably aromatic, somewhat camphoraceous orris-like odour.

The principal constituents of elecampane are *bitter extractive, helenin,* and *inulin;* a trace of *volatile oil* is also present. The tonic properties of the root are said to reside in the bitter extractive. *Inulin,* which has the same composition as starch, was first discovered by Valentine Rose in this root. It is of common occurrence in the roots of the Compositæ, and at present has not been found in the plants of any other order. As usually seen it is a white powder, without taste or odour. It is coloured yellow by iodine, and is readily soluble in about three parts of boiling water, forming a clear solution, but on cooling the inulin is nearly all deposited. By these characters it may be readily distinguished from ordinary starch. Inulin is most abundant in the root in autumn, thus Dragendorff obtained from it in October as much as 44 per cent., but in spring only 19 per cent. By immersing elecampane root in glycerine or alcohol, as first shown by Sachs, inulin is precipitated in globular aggregations of needle-shaped crystalline forms. *Helenin* was, until recently, considered as a distinct body, and was commonly known as *elecampane-camphor;* but from the researches of Kallen, it would appear to be resolvable into two crystallizable substances, which he has named *helenin* and *alantcamphor* or *elecampane-camphor.* Helenin is described as a body without taste or odour; and alantcamphor as having a peppermint odour and taste. Further research by the same experimenter has shown that when elecampane root is exhausted with alcohol, and the extract is precipitated with water, the crystals then obtained contain, besides helenin, two other bodies. One of these has not yet been obtained pure, but it is without doubt isomeric with laurel-camphor. This he terms *inulol;* the other,

which exists in much larger quantity, is the anhydride of an acid called *inulic acid.*

Medical Properties and Uses.—Elecampane has been regarded as an aromatic tonic; and also as diaphoretic, diuretic, expectorant, and emmenagogue. It was formerly highly valued, but it is now but rarely employed except in veterinary practice. It has been prescribed in chronic catarrh, and in dyspepsia attended with relaxation and debility; and in the United States it has been also highly recommended both for external use and internal administration, in tetter, psora, and other diseases of the skin.

Elecampane is one of the substances used in France and Switzerland in the preparation of *Absinthe,* a liqueur which is described under *Artemisia Absinthium.*

Per. Mat. Med., vol. ii, pt. 2, p. 16; Steph. & Church., Med. Bot., by Burnett, vol. i, pl. 49; Pharmacographia, p. 340; U. S. Disp., by W. & B., p. 479; Gmelin's Chemistry, vol. xvii, p. 522; Kallen, in Berichte der Deutschen Chemischen Gesellschaft, 1874, p. 1506; Dragendorff, Materialien zu einer Monographie des Inulins, St. Petersburg, 1870; Prantl's Inulin, in Pharm. Journ., vol. ii, 3rd ser., p. 262; Pharm. Journ., 3rd ser., vol. vii, p. 156.

DESCRIPTION OF PLATE.

Drawn from a specimen in Kew Gardens.

1. Upper part of a flowering stem.
2. Section of a flower-head.
3. A disk flower.
4. Section of the same.
5. A ray-flower.
6. The stamens.
7. A stamen, more enlarged.
8, 9. Fruit.
10. Vertical, and—11. Transverse section of the same.

(2–11 magnified.)

D.Blair ad nat. del. et lith.

M & N Hanhart imp.

ANACYCLUS PYRETHRUM, *D.*

N. Ord. Compositæ.

Tribe *Anthemideæ*.

Genus Anacyclus,* *Linn.* B. & H., Gen., ii, p. 419. Species 10, natives of the Mediterranean region.

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151. Anacyclus Pyrethrum,† *DC., Flore Franc.*, v, *p.* 480 (1815).

Pellitory of Spain. Pellitory.

Syn.—Anthemis Pyrethrum, *Linn.* Anacyclus pseudo-Pyrethrum, *Ascherson.*

Figures.—Woodville, t. 20; Steph. & Ch., t. 97; Nees, t. 244; Lamarck, Illustr., t. 683, f. 4; Miller, Ic., t. 38; Reich., Ic. Fl. Germ., t. 999.

Description.—A perennial herb with numerous spreading, prostrate or ascending, branched stems, more or less hairy in their upper portions, nearly smooth below, and coming from the crown of a long, tapering, vertical, brown, slightly branched root. Leaves alternate, the ones at the root-crown long-stalked, ovate or oblong in outline, deeply bipinnatisect, segments linear, acute, often again 2- or 3-fid, more or less hairy or nearly glabrous. Heads terminal, large, 1—1½ inch or more wide, with a wide disk; involucral scales in several rows, imbricated, ovate-lanceolate, varying in width, blunt or subacute, smooth, pale-green, bordered with an edge of brown; receptacle slightly convex, with large obovate rounded transparent scales beneath the flowers. Disk-flowers bisexual, corolla tubular, contracted below, with 5 equal triangular spreading teeth, yellow; anthers apiculate, not tailed at the base, included in the corolla; style exserted, stigma bifid, with 2 linear branches. Ray-flowers female, in a single row, corolla ligulate, the limb broadly oval, trifid at the apex, white above, tinged with bright pink below. Fruit

* *Anacyclus*—abridged from *Ananthocyclus*, Vaillant's name for the genus—from ἀ not, ἄνθος flower, and κύκλος a circle, in allusion to the outer ovaries being without flowers (Théis).

† *Pyrethrum*; the πύρεθρον of Dioscorides (perhaps really applied to more than one plant) was referred to this by the botanical writers of the pre-Linnean period.

dorsally compressed, obovoid, smooth, the outer ones at least drawn out at each edge into a narrow wing, more or less deeply denticulate above forming a short scarious pappus, and prolonged at the sides into two short auricles.

Habitat.—Though called Pellitory of Spain, this plant does not grow wild in Europe; but is confined to Algeria, where it is found not uncommonly in the higher plains at some distance from the coast, flowering from April till June. It is also grown for use in that country. As a cultivated plant it has long been known in Europe, and is a very old though rather rare inhabitant of English gardens, having been grown here by Lobel in 1570, and Gerard in 1596. It is said very rarely to ripen seed in this country.

The plant figured is that called by Ascherson *A. pseudo-Pyrethrum* (*A. Pyrethrum*, Cassini, non DC., according to him), and differs from the true plant in its smaller heads, greener involucral scales, with the brown rim narrower, and a broader and more denticulate wing to the fruit; though these characters are easily observed, the two plants do not appear to be distinguished in this country, but are both grown under the name of *A. Pyrethrum*. Of the figures quoted above, Reichenbach's and perhaps Nees's certainly represent *A. pseudo-Pyrethrum*, Asch.

DC. Prod., vi, p. 15; Desfont., Fl. Atlantica. p. 287; Ascherson, in Bonplandia, 1858, p. 118; Lindl., Fl. Med., p. 460.

Official Part and Names.—Pyrethri Radix; the root (B. P.). The root (I. P.). Pyrethrum; the root (U. S. P. *Secondary*).

Collection and Commerce.—Pellitory root is chiefly collected in Algeria, from whence it is exported either by way of Oran and Algiers; or it is forwarded from Algeria to Tunis, then shipped to Leghorn and Egypt, and from Egypt it is exported in large quantities to India.

General Characters and Composition.—Pellitory root, Pellitory, or as it is also called Pellitory of Spain, occurs in pieces, which on an average are about the thickness and length of the little finger, but varying in these respects from about 2 to 4 inches in

length, and from ½ an inch to nearly ¾ of an inch in thickness. The pieces are straight or slightly curved, cylindrical or somewhat tapering, and occasionally crowned above by the remains of leaves; they are unbranched, but are sometimes furnished with a few hair-like rootlets. The external surface is brown, rough, shrivelled longitudinally, and marked by numerous dark-coloured receptacles of resin. Pellitory root is brittle, and breaks with a close, compact, resinous fracture; the fractured surface shows no trace of pith, but presents a radiated appearance from the large size of the medullary rays, and is marked by numerous dark-coloured receptacles of resin. It has no very evident odour, only feebly aromatic; and but little taste at first, but when chewed, it excites a singular burning and pricking sensation over the whole mouth and throat, which remains for some time, and causes a copious flow of saliva.

Pellitory root has been frequently analysed, and its activity proved to reside in an acrid matter, called by Parisel *pyrethrin*. But this so-called *pyrethrin* is, in reality, a mixed substance, consisting, according to Koene, of a *brown acrid resin*, which is probably the more important principle, and the one in which the activity of the root essentially resides; of an *acrid brown fixed oil*, and *a yellow acrid oil*. The root also contains *inulin* in large proportion, a little *volatile oil*, *gum*, a trace of *tannic acid*, and other constituents of no particular importance.

Medical Properties and Uses.—Pellitory is a powerful irritant and sialagogue, and when applied to the skin, it acts as a rubefacient. It is rarely or ever given internally; but is chiefly used as a masticatory, or in the form of a gargle prepared by diluting the official tincture with water. As a masticatory it has been found useful in toothache, aphonia, paralysis of the tongue and muscles of the throat, and in neuralgic affections of the teeth, &c. As a gargle it is often employed with advantage in relaxation of the uvula or tonsils, and in other cases. A few drops of the tincture are also sometimes applied on cotton wool to the cavity of a decayed tooth for the relief of toothache. A recent case reported in the *Practitioner* shows the necessity of exercising

caution in its use, for the swallowing by a child of three and a half years old, of about fifty minims of the tincture, was followed by profuse perspiration and restlessness, succeeded by an exhausting and painful diarrhœa, then by stupor, rapid and weak pulse, and twitching of the limbs, and subsequently after fourteen hours by violent convulsions which left the child apparently moribund, but he ultimately recovered under treatment by enemata of starch with five drops of tincture of opium, port wine and coffee, and by the application of ice to the forehead and spine.

In India and some other parts of the East it is a favourite remedy; it is given internally by the Mahomedans, as a cordial and stimulant, in the lethargic stages of typhus fever, and in paralytic affections.

Per. Mat. Med., vol. ii, pt. 2, p. 21; Pharmacographia, p. 342; U. S. Disp., by W. & B., p. 719; Waring's Man. Pract. Therap., p. 601; Ainslie's Mat. Med. of Hindostan, p. 34; O'Shaughnessy's Bengal Disp., p. 414; H. Langley Brown, in Practitioner for August, 1876.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Gardens, Kew.

1. A prostrate stem with numerous flower-heads.
2. Section of a flower-head.
3. A disk-flower.
4. Section of corolla.
5. A ray-flower.
6. A stamen.
7. The stigma.
8. Scale from the receptacle.

(2–8 enlarged.)

D Blair F.L.S. ad nat. del. et lith

M & N. Hanhart imp.

ANACYCLUS OFFICINARUM, *Hayne*

N. Ord. Compositæ.

Tribe *Anthemideæ*.

Genus Anacyclus, *Linn.*

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152. Anacyclus officinarum, *Hayne, Darst. und Beschr. der Arzn. Gewächse,* ix, 46 (1825).

German Pellitory.

Figures.—Hayne, ix, t. 46; Berg, Characterist., t. 51, fig. 390; Berg and Sch., t. 34 e.

Description.—An annual herb, with a slender, tapering, simple root. Stem erect, 6—12 inches high, cylindrical, striate, slightly hairy, simple or with 2 or 3 branches. Root-leaves rather tufted, 4—6 inches long, on long petioles dilated at the base, narrowly oval-oblong in outline, very deeply cut into rather distant mostly opposite pinnæ, which are again divided into numerous, linear, short, acute segments, pale green, smooth; stem-leaves smaller, but similar. Heads large, over 1½ inches broad (the disk very wide), solitary, terminating the stem and branches, and usually close above the uppermost leaves so as to have a sessile appearance, involucral scales imbricated in a few rows, ovate, blunt, smooth, pale green, with a very narrow pale brown margin, scales of the receptacle broadly oval, very blunt, scarious, the margin often slightly lacerated, but rather variable. Flowers much as in *A. Pyrethrum*, but larger. Fruit (not seen) much as in the last, but with the wings cartilaginous and not transparent.

Habitat.—This plant is not known in a wild state, but has long been grown for use in districts of Prussia and Saxony, especially in the neighbourhood of Magdeburg, where it flowers in July and August.

Most botanists consider it to be in all probability an annual form of some other species of *Anacyclus*. Endlicher, indeed, thinks it derived from *A. Pyrethrum;* and it clearly has affinity with the perennial species. De Candolle, on the other

hand, refers it to *A. pulcher*, Besser, a Polish plant, of which little is known, but which is said to be perhaps a form of *A. clavatus*, Pers., an annual species common in many parts of the Mediterranean region.

The plant is said to be grown in Glasnevin Botanic Gardens at Dublin, but we have not seen it in English gardens. In several herbaria here it is represented by the very different *Anthemis altissima*, DC., a Mediterranean species.

DC. Prod., vi, p, 16; Koch, Fl. German., ed. 2, p. 415; Reichenb., Ic. Fl. Germ., xvi, p. 56; Ascherson, in Bonplandia, 1858, p. 118.

Part Used and Name.—Pyrethri Germanici Radix; the root. It is not official in the British Pharmacopœia, the Pharmacopœia of India, or the Pharmacopœia of the United States, the root recognised in these Pharmacopœias being derived from Africa, and hence known to pharmacologists as African pellitory; it is described by us under *Anacyclus Pyrethrum*. The present root, which is distinguished as German Pellitory, is used as a substitute for our official pellitory in some parts of the Continent, more especially in Austria, Germany, Russia, and Scandinavia; it is official in the Austrian and some other European Pharmacopœias.

Collection.—The root is principally collected for medicinal use in Saxony, Prussia, and Bohemia, where it is cultivated for the purpose.

General Characters and Composition.—German Pellitory root is readily distinguished by its smaller size from our official or African pellitory, being commonly only half as thick as it. It has a greyish-brown colour externally, and almost invariably presents at its upper extremity abundant remains of leaves. It is unbranched, but tapers gradually downwards, and terminates in a few hair-like rootlets of a yellowish-brown colour. These rootlets are commonly broken off when the root is collected for use. The main root is somewhat bent or twisted, and marked with deep interrupted furrows. On a transverse section we observe a moderately thick cortical portion of a brown or yellowish-brown

colour, the outer part being darker than the inner and containing here and there dark-coloured receptacles of resin or resin-ducts. The bark is the active part of the root. German Pellitory has no evident odour; and like African Pellitory but little taste at first, but when chewed exciting a pungent, burning, and pricking sensation, and a copious flow of saliva. It is quite as pungent as our official pellitory.

In its chemical composition German Pellitory appears to present no marked differences from African Pellitory.

Adulterations.—German pellitory is said to be sometimes adulterated with the roots of the common Sow-thistle (*Sonchus oleraceus*, L.), and of Sneezewort (*Achillea Ptarmica*, L.). The former may be distinguished by its more serpentine character, by being covered thickly with rootlets, and by its lighter yellowish-brown colour; the latter by the different characters presented by the remains of the leaves on its upper extremity, by its more woody interior, and by its want of pungency when chewed.

Medical Properties and Uses.—Its properties are similar to, and may be therefore used in like cases to those of, our official pellitory.

Pharmacographia, p. 343; Vogl, Comment. on Austr. Pharm.; Wigand, Lehrbuch der Pharmacognosie; Goebel and Kunze, Band 2; Planchon, Drogues Simples, vol. i, p. 509; Ascherson, in Bonplandia, 15 April, 1858.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, grown at Magdeburg, Saxony; the fruit added from Berg & Schmidt.

1. The whole plant (divided).
2. Section of flower-head.
3. A disk flower.
4. An anther.
5. Scale from the receptacle.
6, 7. Fruit.
8. Section of the same.

(3–8 enlarged.)

D Blair F.L.S. ad nat. del et lith.

M & N Hanhart imp

ACHILLÆA MILLEFOLIUM, *Linn.*

N. Ord. Compositæ,

Tribe *Anthemideæ*.

Genus **Achillea**,* *Linn.* B. & H., Gen., ii, p. 419. Species 100, natives of the northern hemisphere, especially of the old world.

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153. Achillea Millefolium,† *Linn., Sp. Plant., ed.* 1, *p.* 899 (1753).

Yarrow. Milfoil.

Syn.—A. setacea, *Waldst. & Kit.*

Figures.—Woodville, t. 15; Nees, 246; Hayne, ix, t. 45; Berg & Sch., t. 19 a; Curt., Fl. Lond., fasc. 6; Syme, E. Bot., v, t. 727 (bad), Reichenb., Ic. Fl. Germ., xvi, t. 1026.

Description.—A perennial herb with a slender creeping root-stock, giving off numerous filiform roots, and several long subterranean, reddish stolons with a blunt succulent scale at each node. Flowering stem erect, 3—18 inches high, stiff, slightly striate, more or less covered with short, white, shaggy hairs, slightly branched above. Leaves alternate, the radical ones often 6 inches long, stalked, with a wide petiole, lanceolate-oblong in outline, the cauline ones much smaller, sessile and oblong, all very deeply bi- or tri-pinnatisect with closely placed, overlapping segments which are again cut into linear, very acute lobes, more or less hairy. Heads small, stalked, numerous, ovoid, erect, crowded, forming together a more or less flat-topped corymbose inflorescence at the ends of the stem and branches, bracts none, or a few linear ones; involucral scales in 2 or 3 rows, strongly imbricate, oblong, blunt, strongly keeled, pale green, with a narrow pale-brown scarious margin; receptacle slightly convex, set with oblong, transparent scales. Disk flowers bisexual, about 8—12; calyx-limb obsolete; corolla tubular, slightly inflated

* *Achillea*, ἀχίλλειος, was the classical name of some aromatic composite plant, named after Achilles, who was said to have discovered its properties.

† *Millefolium*, the name for the plant in the middle ages; from its multifid leaves.

above, 5-toothed, with a few glands on the exterior, yellow; anther-cells without tails at the base, slightly projecting beyond the corolla. Ray flowers about 5, female; corolla ligulate, the limb short, almost circular, slightly 3-lobed, reflexed, white or pinkish; style exserted, stigma bifid, with recurved truncate branches, brush-like at the end. Fruit compressed, smooth, shining, without any crown or pappus.

Habitat.—One of the commonest of our wild plants, in dry meadows, and on heaths, downs, waste ground, and roadsides, almost everywhere throughout this country. Abroad it has a wide distribution throughout Europe, Western Asia, and North America, and extends into the Arctic regions of both hemispheres and to the Himalayas. It flowers from July till late in the autumn. The size of the heads and the amount of woolliness is liable to considerable variation, and the ray flowers are not unfrequently pink or a fine rose-colour, or even purplish in some garden varieties. In alpine localities it is very dwarf and stunted.

The leaves, though so deeply divided, are usually simple, a very narrow band running down either side of the midrib.

Syme, E. Bot., v, p. 57; Hook. f. Stud. Fl., p. 201; Watson, Comp. Cyb. Br., p. 237; Gren. & Godr., ii, p. 162; Ledebour, Fl. Ross., ii, p. 531; A. Gray, Man. Bot. U. States, p. 265.

Official Part and Names.—ACHILLEA, *Yarrow;* the leaves and flowering tops (U. S. P. *Secondary*). It is not official in the British Pharmacopœia, or the Pharmacopœia of India. But the leaves and flowers were formerly official in the Edinburgh Pharmacopœia.

General Characters and Composition.—The leaves, flowering tops, and herb generally, have, when fresh, an agreeable and somewhat aromatic odour, which they retain in a great degree if carefully dried; and a bitterish, aromatic, and slightly astringent taste. The aromatic properties are most marked in the flowers, and the astringent and bitter qualities in the leaves. According to Griffith, the plant, which has become naturalised in the northern

and middle States of America, has more active properties than that found in Europe.

Yarrow has been analysed by Sprengel, Ch. C. Sears, and Zanon, and its principal constituents, have been found to be a *volatile oil*, a *bitter principle* called *achilleine*, an acid termed *achilleic acid*, and *tannin*. Its properties are more especially due to the volatile oil, achilleine, and tannic acid. The oil may be readily obtained by distilling the flowering herb with water; it has a beautiful blue colour, and the odour of the plant.

Medical Properties and Uses.—The properties of yarrow are those of a mild aromatic tonic and astringent. In former times it had a high reputation as a vulnerary, hence its common English name of *Nose-bleed*, and its French name *Herbe aux Charpentiers*. In some parts of Sweden, according to Linneus, it was employed instead of hops in the preparation of beer, which it was thought to render more intoxicating. At present it is but very rarely used in European practice, but its introduction of late years into the Pharmacopœia of the United States will probably lead to its properties being again tested; and from recent testimony it would appear to be more especially valuable as an emmenagogue; as a local application and internal remedy in hæmorrhoidal affections; and in certain atonic conditions of the bladder which are attended with discharges. It is said to be "especially useful in correcting the involuntary discharge of urine in children." It has also been employed in intermittent fevers; and as an antispasmodic in flatulence, colic, and nervous affections. The bitter principle (*achilleine*) has also been recommended as an antiperiodic. The best form for administering yarrow is as an infusion, which may be prepared by macerating an ounce of the leaves and flowering tops in a pint of water; this may be given in doses of a wineglassful or more. The volatile oil may also be employed in doses of from ten to thirty drops.

Gerarde's Herball, by Johnson (1636), p. 1073; Miller's Gard. Dict., vol. i, pt. 1; Griffith's Med. Bot., p. 403; Linneus, Flor. Suec., p. 299; U. S. Disp., by W. & B., p. 17; Watts' Dict. Chem., vol. i, p. 36; Porcher's Med. Bot. of South

Carolina, p. 796; Waring in Pharm. Journ., ser. 2, vol. v, p. 504; Proc. Amer. Pharm. Assoc. (1862), p. 113; Journ. de Pharm. et de Chem., vol. xviii, p. 62; Bullet. Gen. de Therap. (1857); Liebig, Annalen., lib. 8, p. 21 (1847).

DESCRIPTION OF PLATE.

Drawn from a specimen gathered at Barnes, Surrey.

1. Upper part, and—2. Lower part of a plant.
3. A head.
4. Section of the same.
5. A ray flower.
6. Stigmas.
7. A disk flower with bract.
8. Section of the same.
9. An anther.

(3—9 enlarged.)

M.& N. Hanhart imp.

ANTHEMIS NOBILIS *Linn*

N. Ord. Compositæ.

Tribe *Anthemideæ*.

Genus Anthemis,* *Linn.* B. & H., Gen., ii, p. 420. About 80 species are described, chiefly natives of Europe and the Mediterranean region.

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154. Anthemis nobilis, *Linn., Sp. Plant., ed.* 1, *p.* 894 (1753).

Chamomile. True Chamomile. Roman Chamomile.

Syn.—Chamomilla nobilis, *Godr.* Ormenis nobilis, *J. Gay.* A. aurea, *DC.*

Figures.—Woodville, t. 19 (bad); Hayne, x, t. 47; Steph. & Ch., t. 38; Nees, t. 245; Berg & Sch., t. 23e; Syme, E. Bot., v, t. 724.

Description.—A perennial herb with a small but much-branched rhizome, and numerous prostrate or ascending stems often rooting at the base, slightly hairy, branched, rarely erect. Leaves alternate, sessile, 1—2 inches long, oblong, blunt, very deeply bi- or tri-pinnatisect, the segments numerous, crowded, short, linear, acute, more or less hairy, grey-green. Heads few, terminating the branches, on long pubescent peduncles (woolly when young), about ¾ inch wide; involucral scales few, in two or three rows, adpressed, broadly oblong, blunt, with wide, scarious, transparent lacerated borders, midrib green, slightly woolly; receptacle very conical, solid, clothed with linear, blunt, often slightly hairy, scarious scales a little shorter than the disk flowers. Disk flowers bisexual, very numerous, small, crowded; corolla tubular, yellow, with a few glands on the outside, campanulate above, cylindrical, somewhat dilated at the base, which is persistent; anthers not tailed at the base, with a large terminal appendage. Ray flowers about 12—20, female; corolla limb oval-oblong, 3-toothed at the apex, white; stigmatic branches recurved, with brush-like ends. Fruit very small, somewhat obovate, slightly compressed, smooth, with 3 faint ridges on the inner face, pale greenish brown, without pappus, but crowned by the persistent base of the corolla.

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* *Anthemis, ἀνθεμίς,* the Greek name for some plant allied to the Chamomile.

Habitat.—A rather common wild plant in England, growing on gravelly heaths, commons, roadsides and similar places; it becomes rarer in the north and is not thought to be native in Scotland, unless perhaps in the Western Isles. About London it is especially frequent, flowering from June to September. Its exotic range is rather limited: it grows in the west and central parts of France, and in Spain, Italy, Portugal, and Dalmatia; in Germany it is doubtfully wild, as also in Southern Russia. The rayless Chamomile found in Portugal, Madeira and the Azores, *A. aurea*, DC., is by most botanists referred to this species.

Chamomile has long been grown in this country, and is now carefully cultivated at Mitcham. The plant under cultivation is always the "double" state, in which the yellow disk-flowers have all or nearly all become converted into white flowers, with ligulate corollas like those of the ray in the wild plant. It is also grown in Germany, France, and Belgium.

Syme, E. Bot., v, p. 53; Hook. f., Stud. Fl., p. 200; Wats., Comp. Cyb. Br., p. 236; Gren. Godr., Fl. France, ii, p. 150; Willk. & Lange, Prod. Fl. Hisp., ii, p. 89; Trimen & Dyer, Fl. Middlesex, p. 154; Lindl., Fl. Med., p. 459; Flück. & Hanb., Pharmacogr., p. 344.

Official Parts and Names.—1. Anthemidis Flores; the dried single and double flower-heads of the common chamomile, wild and cultivated: 2. Oleum Anthemidis; the oil distilled in Britain from chamomile flowers (B. P.). The dried flower-heads, single or double (I. P.). Anthemis; the flowers (U. S. P.).

1. Anthemidis Flores.—*Production and Commerce.*—The chamomile flowers in use in Great Britain are either derived from plants cultivated in this country, and chiefly at Mitcham; or they are sometimes obtained from abroad, being largely grown in Saxony, and to some extent also, in France and Belgium. For use in the United States the flowers are chiefly imported from Germany and England. English chamomiles fetch, as a general rule, more than double the price of foreign chamomiles. Commercial chamomile flowers are never obtained from the wild plant; but the fresh wild plant is said to be sometimes sold in London for making the

extract, a practice, however, which ought never to be followed, as the produce is extremely different from that made as directed in the British Pharmacopœia, from the dried flowers. At Mitcham the flowers are carefully gathered, and afterwards dried by artificial heat; which process generally takes only a single day.

General Characters and Varieties.—The official chamomiles now being described, are commonly known on the Continent as *Roman Chamomiles* to distinguish them from the flowers of *Matricaria Chamomilla*, which are there usually termed *Common Chamomiles*; the characters of these are given by us under the plant yielding them. In the British Pharmacopœia chamomile flowers are thus characterised:—"The single variety consists of both yellow tubular and white strap-shaped florets; the double of white strap-shaped florets only; all arising from a conical scaly receptacle; both varieties, but especially the single, are bitter and very aromatic."

The two kinds of chamomile flowers which are known in commerce as single and double chamomiles are both derived from cultivated plants, for, as we have before noticed, the chamomiles of the shops are never obtained from wild plants. *Single Chamomile Flowers*, strictly speaking, are those which have only one row of white ligulate or strap-shaped florets, which are placed at their circumference, the whole of the florets within these being yellow and tubular; such flowers only occur in the wild plant. But in the cultivated plant a variable number of the yellow tubular florets become converted into those which are white and ligulate, and it is such flowers, which from having a more or less yellow centre, are usually called *single chamomiles*. The distinction therefore between single and double commercial chamomiles is to a certain extent arbitrary. *Double Chamomile flowers* are those in which all or nearly all the yellow tubular florets have become converted into white ligulate ones. The flower-heads are consequently larger, whiter, and more showy than the single chamomiles, and are commonly preferred to them; but as the tubular florets are more odorous and somewhat more bitter than the ligulate ones, the single chamomiles have the most powerful

medicinal properties. The largest, most double, and whitish flowers, however, fetch the highest price, affording another instance of quality being sacrificed to appearance.

In both varieties of chamomile flowers the receptacle is solid, very conical in form, and furnished with closely arranged, narrow, chaffy scales, from the axils of which grow the numerous florets.

Substitutions and Adulterations.—In France the flower-heads of two other plants allied to those of the true chamomile plant are sometimes substituted for, or mixed with, the flowers of the latter, namely, those of *Matricaria Parthenium,* Linn., and *Matricaria parthenoides,* Desf. The latter adulteration or substitution is scarcely likely to occur in this country, and even should such ever take place, the commercial flowers resemble so closely those of *Matricaria Parthenium,* that they may be both known from those of *Anthemis nobilis* by similar distinctive characters. Neither is it probable that the single flowers of *Matricaria Parthenium,* which are commonly known as Feverfew flowers, would be substituted for, or mixed with, true Chamomile flowers; but if such should be the case, the *latter* could be at once distinguished by their pleasantly aromatic odour and scaly conical receptacle, as the *former* have a strong disagreeable odour, and a nearly flat receptacle without scales. Double Feverfew flowers have, however, been found in this country mixed with double chamomile flowers; and described by one of us in the Pharmaceutical Journal. These two flower-heads have a striking resemblance when superficially examined, but with ordinary care they may be readily distinguished by their different odour and form of receptacle, as just noticed, with their single flowers. Double feverfew flowers resemble, however, double chamomile flowers in having like them a scaly receptacle, in which character they differ from single feverfew flowers. But the scales of double chamomile flowers are chaffy, and densely cover the receptacle, while those of the double feverfew flowers are much fewer in number, and less membranous in their nature; and thus the two flower-heads may be readily distinguished from each other.

Composition.—The principal constituents of chamomile flowers and to which they owe their properties are a *volatile oil* which is described below, and a *bitter acid substance,* which according to Camboulises, crystallises in needle-like prisms, and which he regards as identical with the *anthemic acid* of Pattone. The former chemist, however, failed to obtain the alkaloid *anthemine* of the latter; and the authors of Pharmacographia also conclude from their experiments, that no alkaloid is present in the flowers.

2. Oleum Anthemidis. — *Production.* — Oil of Chamomile is directed in the B. P. to be distilled in Britain from chamomile flowers; but at Mitcham the oil is generally distilled from the entire plant after the best flowers have been gathered. The yield of oil is given by Flückiger and Hanbury as only about $\frac{1}{5}$ per cent.; but Pereira states that one hundredweight of flowers yield from one and a half to two fluid ounces of oil. Single chamomile flowers yield more oil than the double flowers, and hence the varying yield of oil obtained by different experimenters is clearly attributable, in some degree at least, to the kind of flowers operated upon.

General Characters and Composition.—The oil distilled from the flowers alone is of a pale blue colour at first, but it becomes yellowish brown by keeping; it has the peculiar aromatic odour and taste of chamomiles. The oil obtained from the distillation of the whole plant has at first a greenish tint, but by exposure to sunlight it acquires a brownish-yellow colour like that of the oil from the flowers after it has been kept. The specific gravity of oil of chamomile is said to be about 0·91.

The recent researches of Demarcay show, that oil of chamomile is a mixture of *butylic and amylic angelate and valerate.* The oil yields about 30 per cent. of pure angelic acid.

Substitution.—Oil of Chamomile is frequently brought from abroad, and as this is said to be commonly derived from *Matricaria Chamomilla,* Linn., the oil distilled in Britain is alone official in this country.

Medical Properties and Uses of the Flowers and Oil.—The

flowers are stimulant, aromatic, and tonic, in moderate doses; and when given in large doses, especially in the form of a warm infusion, they act as an emetic. They are also regarded as anti-periodic. They form a very useful stomachic and tonic in atonic dyspepsia and flatulence. The warm infusion is useful as an emetic on the access of pyrexia; or it may be used to promote the operation of other emetics. Formerly chamomile flowers were much employed in intermittents, but their use in such cases has now been almost entirely superseded by cinchona barks and other far more efficient remedies. Fomentations of hot infusion of chamomile flowers are sometimes used, but they present no marked advantage over water at the same temperature. Flannel bags filled with chamomile flowers are, however, useful topical agents for the application of moist warmth, on account of their retention of heat.

Oil of Chamomile possesses stimulant and antispasmodic properties. It is a valuable remedy in flatulence; and is also a frequent addition to purgative pills to prevent their griping action.

Per. Mat. Med., vol. ii, pt. 2, p. 19; Per. Mat. Med., by B. & R., p. 682; Pharmacographia, p. 344; U. S. Disp., by W. & B., pp. 128 & 591; Pharm. Journ., ser. 1, vol. x, p. 116; Journ. de Pharm., Mai, 1859, p. 347; Bentley, in Pharm. Journ., ser. 2, vol. i, p. 447, with figures; Pattone, Journ. de Pharm., 1858, p. 198.

DESCRIPTION OF PLATE.

Drawn from a specimen collected at Barnes, Surrey; the "double" head from a plant cultivated at Mitcham, sent by Dr. S. Piesse. 1. A flowering stem. 2. Section of a flower-head. 3. A disk flower. 4. Section of the same. 5. A stamen. 6. A ray flower. 7. Stigmas of a ray flower. 8. Scales from the receptacle. 9. Ripe fruit. 10, 11. Sections of the same. 12. Flower-head of the cultivated form. (3–11 enlarged.)

D Blair, F.L.S. ad nat. del. et lith.

MATRICARIA CHAMOMILLA, *Linn.*

M & N Hanhart imp.

N. Ord. Compositæ.

Tribe *Anthemideæ*.

Genus Matricaria,* *Linn.* B. & H., Gen., ii, p. 427. Species about 20, inhabitants of the northern hemisphere and of South Africa.

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155. Matricaria Chamomilla,† *Linn., Sp. Plant., ed.* 1, *p.* 891 (1753).

Wild Chamomile.

Syn.—Chrysanthemum Chamomilla, *E. Meyer.* Chamomilla officinalis, *C. Koch.*

Figures.—Hayne, i, t. 3; Nees, t. 241; Berg & Sch., t. 23 f; Curt. Fl. Lond., fasc. 5; Syme, E. Bot., v, t. 719 (bad); Reich., Ic. Fl. Germ., xvi, t. 997.

Description.—An annual herb, stem erect, 1—2 feet high, much branched, solid, smooth and shining, strongly striate, pale green, branches long, slender. Leaves numerous, alternate, sessile, with a dilated base embracing half the stem, oblong-oval in outline, obtuse, bi- or tripinnatisect, the ultimate segments narrow, setaceous, acute, spreading and curved, quite smooth, bright green. Flower-heads numerous, terminating the slender branches and forming a more or less corymbose inflorescence, small, about $\frac{5}{8}$ inch wide; involucre flat, composed of a single or 2 or 3 rows of very small, equal, linear, smooth, blunt scales with scarious brownish ends and transparent margins; receptacle at first broadly ovoid and solid, afterwards becoming elongated, conical-ovoid and hollow, smooth, without scales. Disk-flowers bisexual, very small and numerous, corolla deeply 5-toothed, pale greenish-yellow, brighter before expansion, with a few small glands on the outside; anthers with a large terminal appendage, not tailed at

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* *Matricaria*, a name introduced by the mediæval pharmacists as equivalent to the Greek παρθένιον; and applied to *M. Parthenium*, L. from its employment in uterine complaints.

† *Chamomilla*, altered by Linnæus from *Chamæmelum*, χαμαίμηλον of Dioscorides, which was probably this species.

the base. Ray-flowers female, rather numerous (15—25), crowded and overlapping, limb scarcely ¼ inch long, oval-oblong, faintly and bluntly 2—3-lobed at the apex, white, involute and erect in the bud, spreading in flower, afterwards quickly deflexed, styles spreading. Fruit very small, oblong-ovoid, somewhat curved, with 5 ribs on the concave side, quite smooth, pale grey, crowned with a very slight raised border, no pappus.

Habitat.—A weed of waste and cultivated ground throughout Europe except the extreme north, and extending through temperate and northern Asia to peninsular India. In England it is very common in most of the southern counties, especially in and about London and other large towns, but scarcely has the look of a native plant; it is of merely casual and sporadic occurrence in the northern parts of Britain. Introduced into Australia it is said to have become in places a troublesome weed. The plant flowers in July and August.

The Greek name signifies "ground-apple" and is appropriate, the whole plant when bruised affording a pleasant aromatic smell very similar to that of apples; by this character *M. Chamomilla* can be easily distinguished from *M. inodora*, L., to which it bears a strong resemblance, but which is scentless. This latter has also large flower-heads, a flatter receptacle, and the fruit, which is twice as large, has 3 very strong ribs on one side and two deep pits on the other. *Anthemis Cotula*, L., another plant likely to be confounded with this, has a very disagreeable fœtid odour, and is also characterised by having the receptacle provided with long setaceous scales, and the ray flowers usually barren.

A variety, *coronata*, J. Gay (*M. pyrethroides*, DC.), has the achenes of the ray flowers or of all the flowers crowned with a lobed scarious pappus.

Hook. f., Stud. Fl., p. 201; Syme, E. Bot., v, p. 48; Watson, Comp. Cyb. Brit., p. 235; Trimen and Dyer, Fl. Middx., p. 156; Gren. & Godr., Fl. France, ii, p. 148; Ledebour, Fl. Ross., ii, p. 545; Boiss., Fl. Orient., iii, p. 323; DC. Prod., vi, p. 51.

Official Part and Name.—MATRICARIA; the flowers (U. S. P.). These flowers, or more properly flower-heads, are generally

termed *German Chamomiles* or *Common Chamomiles* to distinguish them from the *true* or *Roman Chamomiles,* which are alone official in the British Pharmacopœia, and the Pharmacopœia of India; these are described under "Anthemis nobilis."

General Characters and Composition. — *German* or *Common Chamomiles* are much smaller than the official chamomiles; they are always quite single, the central florets being yellow and tubular, and those of the circumference white and ligulate. Their odour somewhat resembles that of Roman chamomiles, but is much fainter and less pleasantly aromatic; their taste is disagreeable, and somewhat bitter. In a dried state they are readily distinguished from the official chamomiles of the British Pharmacopœia, by their smaller size; their nearly flat involucre; by the bracts of the involucre not being so membranous at their margins; and by their hollow receptacle devoid of scales.

The principal constituents of German Chamomiles, which are readily taken up by alcohol and water, are *volatile oil* and *bitter extractive.* The volatile oil, which may be obtained by distilling them with water, is of a dark blue colour, nearly opaque in mass, with a strong odour of the flowers, and somewhat resembling that of apples, and an aromatic burning taste. It becomes brown by age. This oil loses its fine blue colour, and becomes green in contact with dilute nitric or hydrochloric acid. Concentrated sulphuric acid produces a reddish-yellow shade. It boils at 464°, and congeals at —4°. It was supposed by Gerhardt to be identical with the official oil from *Anthemis nobilis;* but Bizio has shown that it has a different composition and reactions. It is said that this oil is often imported into Great Britain, and sold for the official oil of chamomile, as we have noticed in our description of *Anthemis nobilis.*

Medical Properties and Uses.—German chamomiles are regarded as having similar properties to the official chamomiles, being a mild stimulant aromatic tonic in moderate doses, and emetic in large doses. They are much used in Germany, and in some other parts of the Continent, for the same purposes, and in like manner, as true chamomiles; but in Great Britain they are never

employed; and even in the United States, where they are official as well as true chamomiles, they are but little used except by practitioners from Germany.

U. S. Disp., by W. & B., p. 556; Watts' Dict. Chem., vol. iii, p. 858; Gmelin's Chem., vol. xiv, p. 365; Bentley, in Pharm. Journ., vol. i, ser. 2, p. 448; Pharm. Journ., vol. iii, ser. 2, p. 429, from Répertoire de Chimie.

DESCRIPTION OF PLATE.

Drawn from a specimen collected on waste ground near Charing Cross, London.

1. Upper half of a plant.
2. Vertical section of a flower-head.
3. An involucral scale,
4. Ray flower.
5. Disk flower.
6. Anther.
7, 8. Fruit.
9. Vertical section of the same

(2–6, 8, 9 enlarged.)

ARTEMISIA ABSINTHIUM Linn.

N. Ord. Compositæ.

Tribe *Anthemideæ*.

Genus **Artemisia**,* *Linn.* B. & H., ii, p. 435. Species 150—200, natives almost entirely of the northern hemisphere in both old and new worlds.

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156. Artemisia Absinthium,† *Linn., Sp. Plant., ed.* 1, *p.* 848 (1753).

Wormwood.

Syn.—Absinthium officinale, *Lam.*

Figures.—Woodville, t. 22; Hayne, ii, t. 11; Nees, t. 235; Steph. & Ch., t. 58, 2nd fig.; Berg & Sch., t. 22 b; Syme, E. Bot., v, t. 731; Reichenb., Ic. Fl. Germ., t. 1029.

Description.—An herbaceous perennial, with a rather large, woody rootstock, giving off short barren leafy shoots and upright branched flowering stems. Stems 1—3 feet high, stiff, almost woody at the base, furrowed, silky with adpressed white hairs, branches short, ascending. Leaves all finely pubescent with close silky hairs, greyish-green above, almost white beneath, those of the barren shoots and base of the stem long-stalked, broadly ovate in outline, tripinnatisect, with the ultimate segments short, oblong, blunt, those higher up bipinnatisect, pinnatisect, and (the highest ones) simple, with the ultimate segments linear-oblong, acute, entire. Heads very numerous, about $\frac{1}{6}$ inch wide, hemispherical, nodding, on short, slender stalks from the axils of longer linear leaves, and with a few small linear bracts below the involucre, arranged in numerous erect, lax, somewhat unilateral, slender racemes at the upper part of the stem and branches, the whole forming a dense pyramidal, leafy inflorescence; involucral-scales in two or three rows, imbricated, obovate, blunt, with a green centre and scarious margins, pube-

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* *Artemisia*, the classical name for *A. arborescens*, L.? or some allied species dedicated to the goddess Ἄρτεμις, the Roman Diana.

† *Absinthium*, in Greek ἀψίνθιον, the classical name for several species of this genus.

scent on the back; receptacle rounded, set with long hairs. Flowers about 40 in a head, the outer row female, the inner bisexual or male, corollas yellow, all tubular, the female narrow, with 2 or 3 short teeth, the bisexual 5-toothed. Anthers acute-tongued at the apex, not tailed at the base. Styles of the female flowers large, the branches recurved; of the hermaphrodite flowers smaller, the branches truncate, with brush-like ends. Fruit small, obovoid, smooth, without a pappus or crown of any sort.

Habitat.—Wormwood is not a very common plant in this country, but is found locally in all parts except the north of Scotland, growing by roadsides, on waste ground, and rubbish, especially near the coast, no doubt in many places the remains of cultivation. It grows throughout Europe (except Scandinavia), and in Algeria and Western Asia to N.W. India; it has also become naturalised in the United States. Its cultivation for use is carried on at Mitcham and other places in this country. It has an unusually strong and pleasant aromatic odour, but there is an insipid form found in Russia; there is also a variety with larger heads occasionally met with.

Syme, E. Bot., v, p. 61; Hook. f., Stud. Fl., p. 203; Wats., Comp. Cyb. Brit., p. 266; Ledebour, Fl. Ross., ii, p. 598; Gren. & Godr., Fl. France, ii, p. 126; Boiss., Fl. Orient., iii, p. 373; DC. Prod., vi, p. 125; Lindl., Fl. Med., p. 464.

Official Parts and Names.—Absinthium, *Wormwood;* the tops and leaves (U. S. P.). It is not now official in the British Pharmacopœia, or the Pharmacopœia of India; but it was formerly official in the London, Edinburgh, and Dublin Pharmacopœias.

Collection.—It should be gathered in July or August, when the plant is in flower; the leaves and flowering tops should be alone employed, and when carefully dried their properties are unimpaired and long retained.

General Characters and Composition.—Wormwood has a whitish-grey colour, a soft silky feel, a strong, peculiar, somewhat aromatic and unpleasant odour, and an intensely bitter, slightly aromatic, and to most persons disagreeable taste. Pereira says the

cold infusion becomes olive-green and turbid on the addition of perchloride of iron. It imparts its properties to both water and spirit.

The principal constituents of wormwood are a *volatile oil*, a bitter principle called *absinthin*, and an acid called by Braconnot *absinthic acid*. The so-called *salt of wormwood* is impure carbonate of potash, and is obtained by incinerating the herb. Absinthic acid is now regarded as identical with succinic acid. The volatile oil, which is isomeric with camphor, has usually a dark green colour, but is sometimes yellow or brown; it has an acrid bitter taste, and the peculiar odour of wormwood. Absinthin is the active bitter principle of the plant; it is an imperfectly crystalline substance, which is slightly soluble in water, very soluble in alcohol, but less so in ether.

Medical Properties and Uses.—Wormwood formerly enjoyed a high reputation as an aromatic tonic, and was also regarded as an anthelmintic, as its common name implies; but it is little employed at the present time, either in this country or the United States, although, as Christison remarks, there seems no reason for the present neglect of it except the caprice of fashion. It is stated to be especially serviceable in atonic dyspepsia; and was largely used in intermittents before the introduction of Cinchona bark. It has also been successfully employed to expel worms; and the freshly powdered root has proved very efficacious in epilepsy.

In large doses it appears to exert a specific influence over the nervous system, as it produces headache, giddiness, &c. These effects are due to the volatile oil, which appears to resemble camphor in its action. It exhibits its narcotic effects on the lower animals by causing epileptiform convulsions, and in large doses, death. A case is recorded in the 'Lancet' in which a man, after taking half an ounce of the volatile oil, became insensible, and was attacked with convulsions, &c., but who recovered under suitable treatment by emetics, stimulants, and demulcents.

This action of the volatile oil appears to throw some light on the statements that have been frequently made of late years, in reference to the highly injurious effects of the long-continued and

excessive use of the liqueur now so largely taken in France and some other parts of the Continent, under the name of *Absinthe*, and which consists essentially of alcohol mixed with the volatile oil of wormwood, and to which some other vegetable ingredients, as angelica, anise, fennel, &c., are added. It is said that the effects produced by absinthe are essentially different from those caused by pure alcoholic drinks. These effects have been designated by the name of *absinthism*, and are characterised, amongst other symptoms, by great restlessness and disturbing dreams at night, trembling of the hands and tongue, giddiness, tendency to epileptiform convulsions, &c. These effects resemble those produced by the volatile oil of wormwood, and hence, although entirely discrediting the absurd and extravagant statements that have been made on the highly injurious action of absinthe, it seems at least probable that the abuse of absinthe is even more dangerous than that of the purer alcoholic drinks.

Per. Mat. Med., vol. ii, pt. 2, p. 23; Christison's Disp., p. 2; U. S. Disp., p. 4; Waring's Man. of Pract. Therap., p. 136; Amer. Journ. Pharm., vol. xxiii, p. 358; Luck, Ann. Chim. Pharm., vol. lxxviii, p. 87; Lancet, Dec. 6, 1862, p. 619; Boston Med. and Surg. Journ., March 5 and 12, 1868, pp. 69 and 83; Pharm. Journ., vol. x, 2nd ser., p. 30; Year Book of Pharm. for 1873, p. 348.

DESCRIPTION OF PLATE.

Drawn from a plant in the Royal Gardens, Kew, flowering in August.

1. Top of flowering stem.
2. A flower-head.
3. Section of the same.
4. A male flower.
5. A female flower.
6. An anther.
7. Upper part of style.
8. A root-leaf.

(2–7 enlarged.)

D. Blair ad nat. del. et lith.

M&N Hanhart imp.

ARTEMISIA PAUCIFLORA *Web*

N. Ord. Compositæ.
Tribe *Anthemideæ*.
Genus Artemisia, *Linn.*

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157. Artemisia pauciflora, *Weber, in Stechm. de Artem., p.* 26 (1775) (non *Willd.* nec *Bieb.*)

Syn.—A. maritima, var. Stechmanniana, *Besser*. A. maritima, var. pauciflora, *Ledebour*. A. Lercheana, *Kar. & Kir.* (non *Weber in Stechm.*)

Not previously figured.

Description.—A small, semi-shrubby perennial with an oblique knotted, fibrous rootstock branching from the crown, from which and from the old branches arise numerous short leafy shoots, and many erect flowering stems about 1 foot high. Stems slender, cylindrical, at first uniformly woolly with a fine white tomentum, afterwards glabrous and woolly in patches, at first leafy in the lower part, afterwards bare, much branched above, branches erect. Leaves small, the largest under 1 inch long, alternate, those on the leafy shoots long-stalked, deeply bipinnatisect, the segments linear blunt, sometimes again trisected, involute when young and very woolly, afterward greyish; the stem-leaves on shorter stalks and with narrower segments, soon withering off, the uppermost ones simple. Heads small, about $\frac{1}{10}$ inch long, oblong-ovoid, blunt, sessile or shortly stalked in the axils of shorter linear leaves, erect, arranged somewhat densely along the upper portions of the slender virgate branches, forming interrupted, elongated, spike-like panicles, the whole making up a rather dense, erect, broom-like inflorescence; scales of the involucre 12—18, imbricate, the outer ones shortest, the innermost longest, oblong, blunt, concave, the inner ones incurved at the apex, all with a broad, thick, yellowish-green midrib, usually with a little short greyish wool and (except the outermost) bordered with a transparent, scarious, glabrous border (widest in the inner scales), in which are numerous scattered glands. Flowers 3 to 5 in each head; calyx-limb a mere rim; corolla broadly tubular, slightly

and gradually narrowed to the base with 5 short triangular segments, the tube dotted externally with glands; stamens with a long terminal apiculus, pointed but not tailed at the base; style with 2 short thick branches, wider upwards and brush-like at the ends.

Habitat.—This kind of wormwood grows in the desert plains or steppes of several parts of Russia, especially in the districts near the lower part of the course of the great rivers Volga and Don, as the neighbourhood of Sarepta, and much further to the east, in the Kirghiz desert of Russian Turkestan, where it is very abundant, and its flower-heads are largely collected for commerce; it doubtless also occurs in intermediate localities.

In all the specimens of typical *A. pauciflora* examined the flowers are in bud or rudimentary. The *flowers* above described are those of a plant in Pallas's herbarium in the British Museum (labelled "*A. Contra*"), which slightly differs from the plant figured and furnishing the rest of the description in having the heads a little larger and the involucral scales slightly spathulate.

The identification of the drug wormseed with this plant is due to Besser, who states that it was then (1834) collected about Sarepta for the druggists. A careful comparison of the commercial heads and those of the present plant has convinced us that they are identical, and there can be little doubt that, as stated by the authors of "Pharmacographia," at least the chief part of the drug is furnished by it.

With regard to other alleged sources. The *A. santonica* of Woodville, t. 25 (figured from a plant then in cultivation under that name at Kew), has heads which bear no resemblance to the drug. *A. Vahliana*, Kostel., which had long been considered by German botanists as the source of the wormseed of trade, is figured in Berg and Sch., t. 29 c, to show how unlike it is to the drug itself, specimens of which are drawn on the same plate for comparison, and bear the name of *A. Cina*. As this name of Berg's was bestowed in advance on an (to him) unknown plant, it has no real claim to be used scientifically. Willkomm, however, in 1872 maintained the name for a plant which he fully

describes as the mother-plant of wormseed, and which was brought from Turkestan by Petzholdt. From the description, this *A. Cina*, Willk. must be very close indeed to *A. pauciflora*; the authors of "Pharmacographia," however, who have had the opportunity of examining an authentic specimen, state that the "flower-heads do not entirely resemble the wormseed of trade in that they have fewer scales."

In adopting here the specific name *A. pauciflora*, Web., it is not intended to express any opinion on the validity of that species, but merely to indicate definitely the plant intended. Most botanists who have studied the numerous and puzzling varieties of these Russian *Artemisiæ* agree in referring the present, along with many other described species, to the common and widely-spread *A. maritima*, Linn., which is frequent on the British coasts and extends under various forms throughout Europe and W. Asia in salt marshes and saline tracts.

Barbary wormseed is referred to *A. Sieberi*, Besser (*A. glomerata*, Sieber, *A. contra*, Linn.?) by Batka, and to *A. ramosa*, C. Smith, by Berg.

Besser, in Bull. de la Soc. Imp. des Nat. de Moscou, vii (1834), p. 31; DC. Prod., vi, p. 102; Ledebour, Fl. Rossica, ii, p. 570; Willkomm, in Bot. Zeit., 1872, 130, abstracted in Pharm. Journ., 1872, p. 762; Flück. & Hanb., Pharmacogr., p. 346; Batka, in Nova Acta Acad. Cæs. Leop.-Carol., xiii (1827), p. 2.

Official Parts and Names.—1. SANTONICA; the unexpanded flower-heads of an undetermined species of Artemisia, *Linn.*: 2. SANTONINUM; a crystalline neutral principle prepared from Santonica (B. P.). The unexpanded flower-heads (*Santonica*) of a species of Artemisia (I. P.). SANTONICA; the unexpanded flowers of Artemisia Cina (*Willkomm*) (U. S. P.).

1. SANTONICA.—*Collection and Commerce.*—From information communicated to Flückiger and Hanbury, it would appear that Santonica is now chiefly, if not entirely, collected on the steppes or vast plains of the Kirghiz, in the northern parts of Turkestan. It is thence forwarded to the great fair of Nishnei-Novgorod, whence

it is distributed to Moscow, St. Petersburg, and Western Europe. The average imports into St. Petersburg, according to Ludwig, in 1862, 1863, and 1864 were about 10,000 cwt. No other later or reliable statements are available.

General Characters and Composition. — This drug, which consists of the minute unexpanded flower-heads resembling seeds in appearance, is known under various names, as *Santonica, Semen Santonicæ, Semen Cinæ, Semen Contra, Semen Sanctum, Wormseed,* and others. The best specimens of santonica are composed almost entirely of the minute unexpanded and unbroken flower-heads; but in commercial specimens we frequently find a variable proportion of stalks and small portions of leaves intermixed with the flower-heads (*capitula*). Flückiger and Hanbury say that, the flower-heads "are so minute that it requires about 90 to make up the weight of one grain." The characters of the capitula are fully given in our botanical description, and those of commercial santonica are thus summed up in the British Pharmacopœia :— "Flower-heads rather more than a line in length and nearly half a line in breadth, fusiform, blunt at each end, pale greenish-brown, smooth; resembling seeds in appearance, but consisting of imbricated involucral scales with a green midrib, enclosing four or five tubular flowers. Flower-heads not round or hairy." Santonica has a bitter, somewhat camphoraceous taste; and when rubbed, it has a strong and agreeable odour, suggestive of camphor and cajuput oil.

The principal constituents of santonica are a *volatile oil, resin,* and a crystalline principle, which is described below under the name of *santonin.* The volatile oil has the peculiar odour and taste of the drug, and is contained in it, in the proportion of about 1 per cent. It boils at about 347°, and is chiefly composed of a substance which has been termed *Cinæbene-camphor.* The anthelmintic properties of santonica appear to be entirely due to santonin.

2. Santoninum.—Santonin or Santonine exists in the drug in proportions varying from 1½ to 2 per cent., and the amount, it is said, rapidly decreases as the flowers expand. Santonin,

as obtained by the process of the British Pharmacopœia, is in colourless flat rhombic prisms, inodorous, feebly bitter fusible, and sublimable by a moderate heat; scarcely soluble in cold water, and but sparingly so even in boiling water, but abundantly in chloroform and in boiling rectified spirit. It is also soluble in the fixed oils; and solutions of the caustic fixed alkalies, and forming with the latter definite compounds, one of which, *Santonate of Soda,* has been employed in medicine instead of santonin; it has the recommendation over it of being soluble in water. Santonin is neutral in its action on test-papers, though capable of combining with bases, as just described. By exposure to daylight, or to the blue or violet rays of the spectrum, the crystals of santonin become yellow; a change which appears to be of a mechanical nature, for, so far as is known, it is unattended by any chemical alteration. Santonin is entirely destructible by a red heat with free access of air. According to the investigations of Hesse, santonin is the anhydride of an acid, which he has called *Santoninic acid,* a crystalline body which, when heated to 248°, is resolved into santonin and water. Cannizzaro and Sestini have also shown that when heated with an alkali, santonin is converted into an acid which they have called *santonic acid,* which is isomeric with santoninic acid, but not resolvable like it into santonin and water; and very recently the same investigators have noticed that santonin in combining with the elements of water yields numerous bodies, one of which is santonic acid.

3. Other Varieties of Santonica.—Besides the official kind of santonica, as described above, and which is distinguished in commerce under the name of *Levant* or *Alexandrian Wormseed;* another variety of wormseed has also been especially described by pharmacologists under the name of *Barbary Wormseed.* Nothing definite is known of its botanical or geographical source, or of its chemical composition; but it is said, although, so far as we know, on no published authority, that santonin cannot be obtained from it. Barbary Wormseed may be readily distinguished from the official or Levant Wormseed by being

covered with a whitish down; it has also a more rounded form. Other varieties of Santonica have also been noticed by writers; but the Levant Wormseed is now the only one ordinarily found in commerce.

Medical Properties and Uses.—Santonica and santonin possess anthelmintic properties, more especially the latter, which is the form in which the drug is now generally administered. The effects of santonin are more especially manifest upon the round-worm (*Ascaris lumbricoides*), which it is said by Küchenmeister to kill more rapidly than any other anthelmintic. It is useless against the tapeworm, and probably also the threadworm (*Oxyuris* (*Ascaris*) *vermicularis*); although many regard it as an effectual remedy against the latter. Its administration should be followed in a few hours by a mild purgative. Santonin is well adapted for children on account of the smallness of the dose required, and from its being without taste or odour. Besides its use as an anthelmintic, it has been recommended as a substitute for quinia in intermittent fevers, but with no satisfactory results. In some persons the use of santonin has been followed by xanthopsy or yellow vision, so that red colours become orange, and blue green; an effect which may last for several hours. This singular action has caused the employment of santonin in amaurosis and some other diseases of the eye, but without any marked benefit. In large doses santonin acts as a poison, causing giddiness, headache, vomiting, convulsions, and even death. In such cases, Professor Binz of Bonn, has recommended the inhalation of chloroform or ether as the most effectual remedy; and also advises purgatives and plenty of drink to be given for the elimination of the drug. Santonica is but little used in the United States, having been superseded by the seeds of *Chenopodium anthelminticum*, which are there universally known under the name of wormseed. These seeds are described by us under the name of the plant from which they are derived.

Per. Mat. Med., by B. & R., p. 686; Pharmacographia, p. 346; U. S. Disp., by W. & B., pp. 773 and 1390; Garr., Mat. Med., p. 293; Stille's Therapeutics and Mat. Med., vol. ii, p. 341; Willkomm, in Botanische Zeitung, 1872, p. 130; Mialhe, in

Pharm. Journ., vol. iii, 1st ser., p. 356; Sestini, in Amer. Journ. Pharm., Nov., 1864, p. 527, and in Chem. News, Aug. 11, 1865, p. 61; Journ. de Pharm., Aug., 1863, p. 161; Binz, in Pharm. Journ., vol. vi, 3rd ser., p. 967; Cannizzaro and Sestini, in L'Union Pharmaceutique, vol. xvii, p. 136.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected by Karelin and Kiriloff in the Soongoro-Kirghiz Desert (no. 789).

1. A plant with the flower-heads unopened.
2. A flower-head.
3. Vertical section of the same.
4. Scales of the involucre.

(2-4 enlarged.)

D'Elsaw F.L.S. ad nat. del. et lith

M&N Hanhart imp.

ARNICA MONTANA, *Linn.*

N. Ord. Compositæ.

Tribe *Senecionideæ*.

Genus Arnica,* *Linn.* B. & H., Gen., ii, p. 440. There are 10 species, natives of montane regions in the northern hemisphere.

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158. Arnica montana, *Linn., Sp. Plant., ed.* 1, *p.* 884 (1753).

Arnica. Mountain Tobacco.

Syn.—Doronicum montanum, *Lam.*

Figures.—Woodville, t. 17; Hayne, vi, t. 47; Steph. & Ch., t. 123 (from a specimen grown in Chelsea Garden); Nees, t. 239; Berg & Sch., t. 13 d; Reichenb., Ic. Fl. Germ., xix, t. 958; Bot. Mag., t. 1749.

Description.—A perennial herb, with a slender rhizome 1—2 inches long, tough, nearly black, giving off beneath numerous filiform roots and marked with the scars of withered leaves of previous years. Flowering stem not more than 12 inches high, usually shorter, erect, stout, cylindrical, solid, covered with short glandular hairs, simple or with one pair of opposite branches above the middle. Leaves few, sessile, opposite, the lower crowded at the base of the flowering stem and spreading, 1½—3 inches long, the upper ones much smaller than the rest, all oblong-ovate, blunt at apex, attenuated at base, entire but slightly waved at the margin, downy with a few longer glandular hairs, bright pale green, paler beneath, the basal ones more or less distinctly 5-nerved. Heads large, 2—2½ inches wide, solitary at the summit of the stem and (when present) lateral branches, slightly nodding; involucre cylindrical, broadly ovoid in the bud, the scales equal, about 16, in two rows, linear-lanceolate, dull green with purplish points, woolly or pubescent with glandular hairs on the outside; receptacle slightly convex, with a pit for each flower, from the centre of each pit a stiff short bristle and round each a ring of short white hairs. Disk-flowers

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* *Arnica* appears to be a corruption of *Ptarmica*, πταρμική, the classical name for some sternutatory plant, probably *Achillea Ptarmica*, L.

very numerous, bisexual, corolla tubular, contracted below, with 5 spreading teeth, yellow; anthers exserted, apiculate, not tailed at the base; stigmatic branches long, clavate and pubescent at the ends. Ray-flowers female, about 15, not overlapping, corolla nearly 1 inch long, oval-strap-shaped with 3 small teeth at the end, yellow, the tube hairy; stigmatic branches flat, recurved. Fruit linear-oblong, truncate above, cylindrical, strongly striate longitudinally, dark-brown, hairy, crowned by a pappus of numerous, simple, pilose, yellowish hairs.

Habitat.—A native of moist upland meadows throughout Northern and Central Europe, becoming a mountain plant in Switzerland, North Italy, and the Pyrenees, and extending up to nearly the level of the snow. It does not occur in the British Islands, but its eastward range extends through Russia into Siberia. The arctic *A. angustifolia* which occurs also in America, is by some botanists considered a variety only.

The plant was introduced into English gardens in 1759, and is cultivated in a few botanical collections, such as Edinburgh and Dublin. The handsome flowers appear in June and July.

The ray-flowers frequently possess abortive or barren stamens.

DC. Prod., vi, p. 317; Gren. & Godr., ii, p. 110; Ledebour, Fl. Ross, ii, p. 622; Lindl., Fl. Med., p. 465.

Official Parts and Names.—Arnicæ Radix; the dried rhizome and rootlets (B. P.). The root (I. P.). Arnica; the flowers (U. S. P.).

1. Arnicæ Radix.—*General Characters and Composition.*—The so-called Arnica root, in reality, consists of the dried rhizome and attached rootlets. It is collected in the mountainous parts of Central and Southern Europe. The rhizome is from about an inch to two inches long, and two or three lines thick; it is nearly cylindrical in form, contorted, and rough from the scars of the fallen leaves, some remains of which are usually to be found on its surface. From its under surface numerous little wiry rootlets arise, which are two or more inches in length, and commonly about the thickness of an ordinary knitting needle.

Both the rhizome and rootlets have a dark-brown colour; a peculiar and faintly aromatic odour; and an acrid, somewhat bitterish, unpleasant taste.

The principal constituents of arnica root are a *volatile oil*, and a peculiar principle called *arnicin*. It also contains about 10 per cent. of *inulin*. The *volatile oil*, according to Sigel, occurs in the proportion of about ½ per cent. in the dried root, and 1 per cent. in the fresh; he found its sp. gr. at 64° to be 0·999.

The active principle *arnicin*, as discovered by Walz, is described by him as a yellow amorphous substance, with an acrid taste, slightly soluble in water, and freely soluble in ether, alcohol, and alkaline solutions. It is supposed to be a glucoside.

Adulteration.—The only adulteration of arnica that has been particularly referred to, is the one pointed out by E. M. Holmes, with the root of *Geum urbanum*. The latter may be readily distinguished by the fact, that it is not a rhizome, but a true root, as it is furnished on all sides with rootlets; and by its astringent taste.

Medical Properties and Uses.—Arnica root when given internally acts as a stimulant and irritant, its action being supposed to be more particularly directed to the spinal cord. It has been employed, chiefly in the form of tincture, in diseases characterised by debility and torpor, as in typhoid fevers, in paralytic affections, amaurosis, some forms of nervous headache, amenorrhœa, asthenic inflammation, and other affections. On the Continent of Europe the virtues of Arnica have been much extolled, but in this country it is but little employed internally. As a local application, however, in sprains, bruises, chilblains, &c., tincture of arnica is much used, and is supposed by many to have a remarkable soothing and resolvent effect, hence arnica has received the name of *panacea lapsorum*. But the experiments of Dr. Garrod appear to indicate that, the efficacy of the tincture in such cases is entirely due to the alcohol employed in its preparation, as he found that about the same remedial effects were produced upon bruises, made by cupping-glasses, by the application of spirit and water, as by that of the tincture of arnica of the same alcoholic

strength. So far as the experience of practitioners in this country is concerned, therefore, it appears that the virtues of arnica, both as a local application and as an internal remedy, have been vastly overrated.

2. Arnica Flowers.—These are official in the Pharmacopœia of the United States, but not in the British Pharmacopœia, or the Pharmacopœia of India. The flowers are also preferred on the Continent.

General Characters and Composition.—The botanical characters of the flowers have been already given. When dried they have a yellowish colour, and a similar odour and taste to the root.

The flowers contain *arnicin* and a *volatile oil*, hence their composition is essentially the same as that of the root; they are said, however, to contain more arnicin than the root, and the volatile oil is stated to be of a different character to that found in it. In 1851, Mr. Bastick also discovered in the flowers, in minute quantity, a peculiar substance, which he named *arnicina*. He described it as alkaline, non-volatile, feebly soluble in water, but more so in alcohol or ether. The *arnicin* of Walz, already alluded to as a constituent of both flowers and root, is a different substance to the *arnicina* of Bastick. Nothing is known of the physiological action of the latter.

Medical Properties and Uses.—Arnica flowers have similar properties to the root, and are fully equal to, if not superior to it in medicinal value. The flowers are, therefore, used in similar cases to those of the root already mentioned. The powdered flowers are also employed as a sternutatory. A fatal case of poisoning by tincture of arnica flowers has been lately recorded; the poisonous effects were attributed to the arnicin of Walz.

Woodville's Med. Bot., vol. i, p. 11; Per. Mat. Med., vol. ii, pt. 2, p. 26; Per. Mat. Med., by B. & R., p. 689; Pharmacographia, p. 350; U. S. Disp., by W. & B., p. 147; Garr., Mat. Med., p. 297; Bastick, in Pharm. Journ., vol. x, ser. 1, p. 386; Liebig's Annalen, 170 (1873), pp. 345—364; Annuaire de Therapeutique, 1854, p. 46; Wilms, Ph. Centralhalle, 1875, No. 24, p. 199, and Proc. Amer. Pharm. Assoc., 1875, p. 166; Holmes, in Pharm. Journ., vol. iv, ser. 3, p. 810.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in the Swiss Alps.

1. A complete plant in flower.
2. Section of a flower-head.
3. A disk-flower.
4. A stamen.
5. Style of disk-flower.
6. A ray-flower.
7. Style of ray-flower.
8, 9. Fruit.
10. Portion of receptacle.
11. Part of a hair of the pappus.

(3–7, 9–11 enlarged.)

D.Blair F.L.S. ad nat. del. et lith.

M & N. Hanhart imp.

TARAXACUM OFFICINALE, *Wigg.*

N. Ord Compositæ.

Tribe *Cichoriaceæ*.

Genus **Taraxacum**,* *Haller*. B. & H., Gen., ii, p. 522. Species variously estimated at 6 to 40, natives chiefly of the temperate regions of the Northern Hemisphere.

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159. Taraxacum officinale, *Wiggers, Prim. Fl. Holsat., p.* 56 (1780).

Dandelion.

Syn.—T. Densleonis, *Desf.* T. vulgare, *Schrank.* Leontodon Taraxacum, *Linn.* L. officinale, *Withering.* L. vulgare, *Lam.*

Figures.—Woodville, t. 16; Hayne, ii, t. 4; Steph. & Ch., t. 5; Nees, t. 249; Berg & Schm., t. 7 c; Curt., Fl. Lond., fasc. 1; Syme, E. Bot., v, tt. 802—804; Reich., Ic. Fl. Germ., xix. tt. 1404—1406.

Description.—A perennial herb, with a vertical, cylindrical, tapering root often a foot or more in length and ½ to 1 inch in diameter, simple or slightly branched, smooth, yellowish-brown externally, white within. Leaves few, all from the crown of the root (short rhizome), somewhat spreading, sessile, about 6—9 inches long, oval-oblong or slightly obovate, acute at the apex, attenuated and tapering at the base, very deeply jagged almost to the base in a pinnatifid manner, the segments triangular, horizontal or backward-pointing, very acute, 5 or 6 on either side, margin with small, unequal, attenuated, spreading teeth or nearly entire, glabrous, thin and shining, bright green. Heads large, 1½—2 inches wide, solitary and terminating erect, cylindrical, tapering, weak, very hollow, smooth and glossy, pale-green scapes from the axils of the leaves and somewhat exceeding them in length; scales of the involucre in several rows, the innermost row of 12—18, erect before and during flowering, then closed, strongly deflexed in fruit, often somewhat connected by their margins below, oblong-linear, blunt and discoloured at the apex, thickened and hard at

* *Taraxacum* or *Taraxacon* was one of the mediæval pharmacists' names for the plant, and probably alludes to its laxative action; ταράσσειν, to trouble or move.

the base, quite glabrous, deep dull green, scales of the outer rows more numerous, shorter, usually recurved, oblong attenuate, with narrowly membranous margins; receptacle flat or slightly concave at flowering, afterwards depressed convex, naked, pitted; flowers very numerous, all bisexual. Corolla strap-shaped, truncate with 5 teeth at the end, brilliant bright yellow, the outer ones tinged with brown on the outside. Anthers shortly tailed at the base. Style hairy above, the arms short, recurved; ovary constricted into a slender short neck below the pappus. Fruit obovate-oblong, compressed, striate, glabrous, olive-brown, the summit and upper part set with many small, short, spreading, spiny prominences; pappus elevated on a very slender, stiff, smooth, pale greenish-white stalk longer than the fruit, of very numerous, delicate, silky, yellowish-white, rough hairs, horizontally spreading and collectively forming a transparent globular head, with the receptacle in the centre.

Habitat.—This is a very familiar plant, being a common weed throughout Great Britain in pastures, roadsides, gardens, and waste ground, in both damp and dry situations, flowering principally in early summer, but also later, and continuing till the end of autumn. The large-flowered form is very handsome and ornamental.

The Dandelion extends throughout Europe, temperate Asia, Japan, and North America, and under small forms (*T. palustre*, DC., *T. udum*, Jord.) reaches to high elevations and into the Arctic regions of both Worlds. It is also found in Algeria and the Azores, &c., but it does not occur in the Southern Hemisphere.

The growth of the stalk of the pappus, which reaches half an inch in length, takes place with great rapidity during the time immediately after flowering, when the leaves of the involucre are strongly closed together.

Syme, E. Bot., v, p. 142; Hook. f. Stud. Fl., p. 215; Watson, Comp. Cyb. Brit., p. 218; Gren. & Godr., Fl. de France, p. 316; A. Gray, Man. Fl. N. U. States, p. 280; DC. Prod., vii, p. 145; Ledebour, Fl. Rossica, ii, p. 812; Lindl., Fl. Med., p. 469.

Official Part and Names.—Taraxaci Radix; the fresh and dried roots of Taraxacum Dens Leonis, *D.C.* (B. P.). The root (I. P.). Taraxacum; the root (U. S. P.).

Collection.—There is much difference of opinion as to the best time for collecting dandelion root for use in medicine. The British Pharmacopœia directs it to be gathered between September and February. In the Pharmacopœia of India it is also ordered to be collected between the months of September and February; and in the Pharmacopœia of the United States it is directed to be gathered in the autumn. But it has been shown by one of us in the 'Pharmaceutical Journal,' that the root is most bitter in July, almost as bitter in March, much less so in October, November, and the commencement of December, and least bitter in the winter months, in fact, even sweetish in frosty weather, or directly afterwards. Hence as the medicinal value of taraxacum root depends in a great measure, if not entirely, on its bitter principle, it would appear that in July it possesses the greatest medicinal value, next to that in the early part of March, then in the autumn, and least in the winter months. As there are practical difficulties in obtaining stable products from the root collected in July, it is contended that the end of February or beginning of March is, as a general rule, the best time for collecting it for use in medicine. Another argument in favour of its collection in the early spring is, that the root then contains less inulin than in the autumn, hence the extract prepared at the latter season becomes opaque from its deposition, which is not the case with the spring made extract. Should the directions of the Pharmacopœia be followed, care must be taken not to collect the roots during, or even for some time after, the prevalence of frost, as this materially lessens their activity.

General Characters and Composition.—The *fresh root* is somewhat tapering, simple or commonly more or less branched, frequently a foot or more in length, and half an inch or more in diameter. Externally it is smooth, of a dull yellow, yellowish-brown, or brownish colour, and has a plump appearance. Internally it is whitish; it breaks readily with a short fracture, and

exudes a milky juice, which becomes pale reddish brown by exposure to the air. It has commonly a bitter taste, more especially, as we have noticed, in the early spring and summer months, but in frosty weather it is sweet; it is without odour. In the process of drying it shrinks very much, and loses about 76 per cent. in weight.

The *dried root* is commonly several inches in length, and half an inch or less in thickness; it presents a contracted and shrivelled appearance, a dark brown or somewhat blackish colour, and is marked with deep longitudinal more or less spirally arranged furrows. It breaks readily with a short corky fracture, and then shows two distinct portions, namely, a cortical or external layer, and an internal central woody axis. The cortical portion is of a whitish colour, and of a corky or somewhat spongy texture. Its diameter is twice, thrice, or more, that of the central axis. It presents according to its thickness, a variable number of distinct irregularly concentric rings, somewhat resembling the annual rings of wood seen in a transverse section of an exogenous stem. These rings are produced from the concentrically arranged laticiferous vessels, and this striking character of dandelion root was first noticed by one of us in a paper published in the 'Pharmaceutical Journal,' in the year 1856. The woody axis is very porous, without any trace of pith or medullary rays, and has a yellow colour, more especially when freshly dried. The root is inodorous, but has a bitterish taste. As dried dandelion root is very liable to the attacks of maggots, it should not be kept more than a year.

The principal constituents of the milky juice of dandelion root are a bitter principle, which has been termed *taraxacin*, and *inulin*. T. and H. Smith, of Edinburgh, have also shown that when the juice is exposed for a short time to the air, it undergoes a kind of fermentation, the result of which is an abundant formation of *mannite*, not a trace of which can be obtained from the perfectly fresh root. *Taraxacin* has been described by Polex as a bitter crystalline substance, readily soluble in alcohol, ether, and boiling water, but sparingly so in cold water. More recently, Kromayer obtained from the dried milky juice, which he named *leontodonium*, a colourless

amorphous mass, of an intensely bitter taste, which he described as *taraxacin;* and a crystalline acrid substance, soluble in alcohol, but not in water, which he termed *taraxacerin.* The activity of taraxacum root as a medicinal agent appears to be essentially due to taraxacin.

Adulterations and Substitutions.—From being generally collected by ignorant persons, dandelion root is very liable to be adulterated with the roots of other common indigenous plants of the districts in which it is obtained; or such roots are entirely substituted for it. In this country the more common roots that have been thus noticed, are, those of *hawkbit, chicory,* and *various kinds of dock.* In the United States chicory root appears to be frequently substituted for that of dandelion. Dandelion root may, however, be readily distinguished from all roots by the characters given above; and more especially by the ringed appearance which it exhibits when broken, or when a transverse section of the root is made. The yellow central axis is also a good distinctive mark of dandelion root. These characteristic marks are, however, most evident in the dried root.

Medical Properties and Uses.—Much difference of opinion exists amongst medical practitioners as to the properties and uses of dandelion root; but it is more commonly regarded as slightly tonic, aperient, and diuretic. It appears also to have an almost specific action on the liver, by modifying and increasing its secretion. Hence it is extensively employed in chronic diseases of the digestive organs, especially hepatic affections, as jaundice, chronic inflammation or enlargement of the liver, dropsies from hepatic obstruction, and dyspepsia attended with deficient biliary secretion. The dried root when powdered is frequently administered mixed with ground coffee, the taste of which disguises that of dandelion. When roasted and powdered, dandelion root has also been used as a substitute for coffee.

The *leaves* of the dandelion plant when very young, and grown in the dark, are blanched, tender, and of a tolerably pleasant taste; and are then sometimes used, especially on the Continent, as a salad.

Per. Mat. Med., vol. ii, pt. 2, p. 31; Fer. Mat. Med., by B. & R p. 692; Pharmacographia, p. 352; U. S. Disp., by W. & B. p. 859; Watts, Dict. Chem., vol. v, p. 670; Garrod, Mat. Med., p. 295; Bentley, Pharm. Journ., vol. i, ser. 2, p. 402; Bentley, Pharm. Journ, with figures, vol. xvi, ser. 1, p. 304; Pharm. Journ., ser. 3, vol. i, p. 882; Giles, Pharm Journ., ser. i, vol. xi, p. 107; Proc. Amer. Pharm. Assoc., vol. xxiii, p. 512.

DESCRIPTION OF PLATE.

Drawn from a specimen collected at Hammersmith, London.

1. A plant, with the root cut away.
2. Section of a flower-head.
3. A single flower.
4. Stamens.
5. Head of fruit.
6. The same, with all the fruits but two fallen away.
7. A fruit.
8. Root.

(3, 4, 7, 8 enlarged.)

D.E.Blair F.L.S. ad nat. del. et lith.

M & N. Hanhart imp

LACTUCA VIROSA, *Linn*

N. Ord. Compositæ.

Tribe *Cichoriaceæ*.

Genus Lactuca,* *Linn.* B. & H., Gen., ii, p. 524. Species over 60; inhabitants of the northern hemisphere of both old and new worlds.

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160. Lactuca virosa,† *Linn., Sp. Plant., ed.* 1, p. 795 (1753).

Wild Lettuce.

Figures.—Woodville, t. 31; Steph. & Ch., t. 12; Nees, t. 250; Syme, E. Bot., v, t. 805; Reichenb., Ic. Fl. Germ., xix, t. 1422.

Description.—A biennial herb with a brown tap-root. Stem 2—6 feet high, erect, cylindrical, with short horizontal branches in the upper part, glabrous, but with small scattered prickles chiefly in the lower part, pale glaucous green, often spotted or tinged with purple. Radical leaves numerous, very large, 6—18 inches long, obovate-oblong, entire, narrowed at the base; stem-leaves few, much smaller, alternate, spreading horizontally, sessile, oblong, acute at the apex, prolonged at the base (especially the upper ones) into two deflexed, rounded, or subacute amplexicaul auricles; margin with irregular spinous denticulations, glabrous, pale glaucous green, the midrib spiny beneath. Heads numerous, shortly stalked, small, $\frac{1}{2}$—$\frac{3}{4}$ inch wide, with several small amplexicaul acute bracts below, arranged in short, stalked, spicate cymes on the divaricate branches, the whole forming a very large lax ovate panicle; involucre oblong, the scales few, imbricated in two or three rows, narrow, glabrous, glaucous green tinged with purple; receptacle flat, naked; flowers few in each head, all bisexual. Corolla strap-shaped, pale yellow, the limb minutely 5-toothed at the end. Anthers with a broad tongue at the apex and two rather long tails at the base. Style hairy above, bifid, with two slender recurved papillose arms; ovary constricted into a short

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* *Lactuca*, the classical Latin name, from the milk-like juice.

† *Virosa*, poisonous; not particularly applicable, but probably originating from the juice having the odour of opium.

neck below the pappus. Fruit oval, strongly compressed, with a broad wing along the edge and 8 slender ribs on each face, rough, almost black, prolonged above into a white beak as long as itself, expanded at the top and carrying the spreading silvery pappus, hairs simple, denticulate.

Habitat.—This kind of Wild Lettuce is not uncommon in England, especially in the south-eastern counties, growing in hedges and on banks, where its large radical leaves are very conspicuous ; the flowers, which appear in August, are only fully expanded in the morning sunshine. The plant grows also throughout western and southern Europe, and extends eastwards to Western Siberia.

The whole plant is traversed by milk-vessels, and the slightest puncture, especially of the young branches or involucral scales, causes an instant copious outflow of the white latex, which on exposure soon becomes brown and solid.

Syme, E. Bot., v, p. 145; Hook. f., Stud. Fl., p. 214; Watson, Cyb. Br., p. 210; Gren. & Godr., Fl. France, ii, p. 320; Ledebour, Fl. Ross., ii, p. 805; Lindl., Fl. Med., p. 469.

Official Part and Name.—Lactuca, *Lettuce;* the flowering herb (B. P.). The flowering herb (I. P.). It is not official in the Pharmacopœia of the United States; its place being there taken by the Garden Lettuce, *Lactuca sativa,* L.

General Characters and Composition.—The whole herb, especially during the period of flowering, abounds in a white milky juice, which instantly exudes when the plant is wounded. This juice has a bitter taste, and a strong opiate-like odour. When the juice is excluded from the air in closely-stopped bottles it undergoes little change; but when exposed to the air it quickly hardens, and assumes a brownish colour, and then constitutes what is termed *lactucarium.* This substance is described by us under " Lactuca sativa," which is also one of its sources. Lactucarium is official in the Pharmacopœia of the United States, but its place is supplied in the British Pharmacopœia, and in the Pharmacopœia of India, by the extract of Lettuce, which is directed to be prepared from the species of *Lactuca* now under description.

The milky juice when fresh reddens litmus paper, and is coagulated both by acids and alcohol. The more important constituents are doubtless those contained in Lactucarium, namely, *lactucerin* or *lactucone*, *lactucin*, and *lactucic acid*; these substances are described under the head of Lactucarium in our article on "Lactuca sativa." The juice also contains a small quantity of a *volatile oil*, to which its odour is due, *albumen*, *resin*, and several *salts*.

Medical Properties and Uses. — This plant has long had a reputation for narcotic properties, but the experiments of Dr. Garrod, who gave lactucarium—which is commonly reputed to be the most active preparation of the plant—in doses of thirty grains and more, repeated every four hours, without observing any very marked narcotic effects from its administration, clearly prove that its powers, if any, must be very slight indeed. The official extract is, however, sometimes given as a mild hypnotic where the use of opium is objectionable, to procure sleep, allay cough, &c. It is also said to be slightly laxative, antispasmodic, and diuretic; and has been employed more especially in Germany, in dropsy. But in the treatment of dropsy, lettuce has been generally combined with squill, digitalis, or some other well-known diuretic, hence it is probable that the observed effect in such cases is essentially due to the latter drugs. It has also been used as a remedy in palpitation of the heart, in intermittent fever, and in other cases, but although it was formerly highly spoken of by practitioners, it is now regarded as useless in such cases.

Per. Mat. Med., vol. ii, pt. 2, p. 36; Pharmacographia, p. 354; U. S. Disp., by W. & B., pp. 517 & 521; Garr., Mat. Med., p. 296; Woodville's Med. Bot., Supplement (1794), p. 100; Steph. & Church., Med. Bot., by Burnett, vol. i, pl. 12; Buchner's Repertorium (1847), 8.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in Chelsea Garden. 1. The flowering plant (much reduced). 2. A branch with flowers. 3. A head. 4. The same in section. 5. A single flower. 6. Portion of a hair of the pappus. 7. Anther. 8. Style. 9. Head of fruit. 10, 11. A single fruit. 12. Vertical, and—13. Horizontal section of the same. (3—9 & 11—13 enlarged.)

D.Blair F.L.S. ad nat. del. et lith.

LACTUCA SATIVA. *Linn*

M & N Harhart Imp

N. Ord. Compositæ.
Tribe *Cichoriaceæ*.
Genus Lactuca, *Linn.*

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161. Lactuca sativa, *Linn., Sp. Plant., ed.* 1, *p.* 795 (1753).

Garden Lettuce.

Syn.—L. sylvestris, *Lam.* L. laciniata, *Roth.* L. capitata, *DC.* L. crispa, *DC.*
Figures.—Hayne, vii, t. 30; Blackwell, Herball, t. 88; Reich., Ic. Fl. Germ., xix, t. 1421.

Description.—Annual or biennial, with a slender tapering root. Stem erect, 2—4 feet high, stiff, straight, cylindrical, striate, very pale green, at first solid, afterwards hollow, quite glabrous, shining, not branched except in the inflorescence. Leaves numerous, rather crowded, alternate, ascending, the lower ones five or six inches long, but gradually decreasing in size up the stem, sessile, smooth on both sides, pale glaucous green, the lower ones obovate-spathulate, obtuse, the base half-stem-clasping and slightly auriculate, the margins slightly undulated or lobed and set with small, unequal, prickly teeth, the upper ones with the bases much more strongly auriculate, and the rounded or acute lobes turned backwards, acute at the apex, usually entire or faintly spinous-denticulate, much folded along the midrib which is also curved downward, the uppermost leaves very small and passing into the bracts of the inflorescence. Heads rather small, numerous, terminating the branchlets of a large compound more or less flat-topped, lax cymose inflorescence with straight ascending branches from the upper part of the stem; bracts numerous, often without flowerheads in their axils, small, acute, usually with large auriculate lobes at the base, smooth and glaucous; involucre and receptacle much as in *L. virosa*. Corolla much as in that species, but the limb rather shorter, more strongly toothed, and paler yellow. Anthers with rather shorter tails. Fruit oval-oblong, compressed, often curved, not winged at the edge, with

six slender ribs on each face, smooth, pale grey (or black), pappus very white and glistening.

Habitat.—This well-known salad plant has not been certainly recognised in a wild state, though its origin has been sought in several species. A. De Candolle and Boissier consider *L. Scariola*, a common European species, to be the parent plant, but Schultz (Bipontinus) states that the wild form really grows in the mountains of Kordofan, where it was collected by Kotschy; others have referred it to India. Its cultivation was carried on by the ancient Greeks, by whom it was called θρίδαξ (thridax), and probably also by other nations of antiquity. It was grown in England in the fifteenth century and probably earlier. The garden varieties are now very numerous, seventy or more being distinguished; the chief differences are the arrangement and form of the lower leaves and the colour of the fruit ("seed"). The "cabbage-lettuces" are produced by the form called *L. capitata*, &c. The plant flowers in July and August.

For medicinal purposes this species is grown in Germany on the Moselle between Treves and Coblenz, and also near Edinburgh. In Auvergne, another species, *L. altissima*, Bieb., is cultivated for lactucarium.

Boiss., Fl. Orient., iii, p. 809; DC. Prod., vii, p. 138; DC. Géogr. Bot., p. 843; Alefeld, Landwirthsch. Bot., p. 184; Fl. & Hanb., Pharmacogr., p. 354.

Official Part and Name.—Lactucarium; the concrete juice obtained from *Lactuca sativa*, by incision and spontaneous evaporation (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India; but it was formerly recognised in the London, Edinburgh, and Dublin Pharmacopœias. Its place is now supplied in the British and Indian Pharmacopœias by *Lactuca virosa*, L., which has been described.

Botanical Source and Nature.—*Lactuca sativa* is given in the Pharmacopœia of the United States as the only botanical source of lactucarium, but this is principally derived at the present day from *Lactuca virosa*; although to some extent also, from *L. sativa* L., *L. Scariola* L., and *L. altissima*, Bieb. All these species yield

more or less of a white milky juice, which has a bitter taste and an opiate odour; this juice when exposed to the air hardens, and becomes of a brownish colour, and in this state it constitutes the substance known as *lactucarium*.

Collection, Preparation, Varieties, and General Characters.—The manner of collecting and preparing the juice varies somewhat in different countries. Thus, in Scotland, where it was formerly alone collected, Mr. Fairgrieve, who cultivates *Lactuca virosa* for the purpose, near Edinburgh, commences its collection, commonly in August, when the plants have thick succulent stalks, and the flower-buds just appearing. The collectors cut the head off each stalk, and scrape the juice which then flows out into little tin vessels. This process they repeat six or seven times a day, each time a new cut being made a little lower down the stalk. The juice collected during the day forms by the evening a thick viscid mass; this is then divided into pieces, which are dried with a gentle heat, the process of desiccation taking about five days. The average yield of lactucarium from each plant is from forty to fifty grains. As thus obtained, *Scotch lactucarium* is in irregular earthy-looking pieces of varying sizes, the larger being about an inch in length; the pieces have a deep brown colour, a strong, somewhat opiate, unpleasant odour, and a very bitter taste.

According to the authors of 'Pharmacographia,' lactucarium is now chiefly prepared near Zell, a small town on the Moselle, in Rhenish Prussia. This kind, which is known as *German lactucarium*, is prepared as follows: In May, just before the period of flowering, the stem is cut off about a foot below the top, after which a transverse slice is taken off daily until September. The juice which then exudes is pure white, but speedily becomes brown on its surface; it is collected from the wounded top by the finger, and placed in hemispherical earthen cups, in which it soon hardens. It is then turned out, and dried first in the sunshine, and subsequently by exposure to the air for some weeks on frames. *German lactucarium* is in angular, more or less shrunken pieces, of a dull reddish-brown colour externally, and

when fresh, creamy white internally, but ultimately assuming an opaque and waxy appearance, which gradually changes to yellow and brown by exposure to the air. It has a similar taste and odour to Scotch lactucarium.

French lactucarium is principally, if not entirely, prepared by Aubergier, of Clermont-Ferrand, in Auvergne. The plant cultivated for the purpose is *Lactuca altissima*, Bieb. The manner of collecting the juice differs from that pursued in Scotland, and also from that followed in Germany. Thus, instead of cutting off the stem near the top, and removing successive slices every day, transverse incisions are made daily, at the time of flowering, into the stem, from above downwards, and the juice which flows from them is collected in a glass vessel. By the time this is full the juice has coagulated, and is then removed; after which it is shaped into circular cakes of about $1\frac{1}{2}$ inches in diameter, which are dried by exposure to the air upon sieves. As found in commerce, it agrees essentially in its characters with German lactucarium, except that instead of being like it in angular lumps, it is in circular cakes, of about $1\frac{1}{2}$ inches in diameter.

Composition.—The principal constituents of lactucarium are *lactucone* or *lactucerin*, *lactucin* and *lactucic acid*. It also contains a small quantity of an amorphous principle, termed *lactucopicrin*; besides a number of other substances which have no special importance. When lactucarium is distilled with water, a small quantity of a *volalile oil* may be also obtained, which has the odour of the drug. *Lactucerin*, when pure, occurs in the form of colourless needles, which are odourless, tasteless, neutral, and insoluble in water, but readily soluble in alcohol or ether. *Lactucin* crystallises in white pearly scales, which are insoluble in ether, but readily soluble in acetic acid or alcohol. It has a bitter taste; and appears to be the essential bitter principle of lactucarium; but lactucopicrin is also said by Kromayer to be very bitter. *Lactucic acid* when first obtained is a light yellow amorphous mass, but it ultimately assumes a crystalline appearance.

Medical Properties and Uses.—The properties and uses of lactucarium have already been given under *Lactuca virosa*.

It is commonly regarded as a mild, although uncertain hypnotic, and may therefore be employed in those cases where the use of opium is objectionable.

Lettuce leaves form a favourite salad. Lettuces should be gathered for use in this way before the flower stems shoot up; they then contain a cooling, bland, pellucid, watery juice. Lettuces are commonly thought to possess very slight soporific properties, and have accordingly been recommended to be taken at supper to promote sleep; but, as seen in our description of the medical properties of lactucarium under "*Lactuca virosa*," such qualities must be almost, if not entirely, absent. The ancients also regarded lettuce leaves as aphrodisiac.

Per. Mat. Med., vol. ii, pt. 2, pp. 34—37; Per. Mat. Med., by B. & R., p. 696; U. S. Disp., by W. & B., p. 517; Pharmacographia, p. 354; Stillé, Therap. & Mat. Med., vol. i, p. 710; Comptes Rendus, vol. xv (1842), p. 923; Garrod, Med. Times and Gazette, March 26th, 1864; Pharm. Journ., vol. vii, ser. 1, p. 74, from Buchner's Repertorium; Pharm. Journ., vol. viii, ser. 3, p. 202; Fairgrieve, in Pharm. Journ., vol. iii, ser. 3, p. 972, and Proc. Amer. Pharm. Assoc., vol. xxii, p. 118; Proc. Amer. Pharm. Assoc., vol. xxv (1877), p. 155.

DESCRIPTION OF PLATE.

Drawn from a garden specimen.

1. Whole plant (much reduced).
2. Branch of inflorescence.
3. Section of a flower-head.
4. A flower.
5. An anther.
6. Style.
7. Head of fruit.

8, 9. Fruit.

(3–6, 9 enlarged.)

L. Blaue ad nat. del. et lith.

M. & N. Hanhart imp.

LOBELIA INFLATA *Linn.*

N. Ord. LOBELIACEÆ. Lindl., Veg. K., p. 692; Le Maout & Decaisne, p. 512.

Tribe *Lobelicæ*.

Genus Lobelia, *Linn.** Alph. DC. in DC. Prod., vii, pp. 357—391. Species 170 or more, natives, of the warmer regions chiefly, of both hemispheres; especially frequent in America and at the Cape of Good Hope.

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162. Lobelia inflata, *Linn.*, in *Act. Upsal.* 1741, *p.* 23.

Indian Tobacco.

Syn.—Rapuntium inflatum, *Mill.*

Figures.—Barton, t. 16; Bigelow, t. 19; Nees, t. 206; Berg & Sch., t. 1 a; Pereira, Mat. Med., p. 1546 (seed).

Description.—An erect annual or biennial herb, 1—2 feet high, slightly branched above. Roots fibrous, stem round, striate, more or less hairy. Leaves alternate; lowest ones stalked, the others sessile; slightly decurrent, thin, light green, pilose on both surfaces, 1½—3 inches long, broadly or narrowly oval, denticulate or erose, obtuse. Inflorescence branched below; lower bracts large, leafy; flowers stalked, erect, small, in upright racemes; pedicels shorter than bracts. Calyx-tube united with ovary, marked with 10 veins, and with a prominent ring below the teeth; teeth 5, longer than the tube, linear, tapering, acute, glabrous. Corolla tubular, split down the centre above to the very base; bilabiate, the upper lip of two narrow, lanceolate, erect segments, the lower of three nearly equal, spreading, triangular-ovate lobes with two short lines of hairs within, pale violet-blue, the lower lip yellowish within. Stamens 5, epigynous, not adherent to corolla; both filaments and anthers united into a tube surrounding the style. Ovary inferior, ovoid, two-celled, with numerous ovules closely packed on large, spongy, axile placentas; style simple; stigmas 2, with a tuft of hair

* Named after Matthias de Lobel, "botanographer to King James I," and author of some valuable works. He was a native of Lille, but lived much in London, where he died in 1616.

below, enclosed in the tube of the anthers. Fruit inflated, obovoid or nearly globular, crowned by the persistent sepals and remains of the corolla; pericarp very thin when ripe, papery and crumpled, pale brown, 2-celled, indehiscent or opening irregularly at the summit. Seeds very numerous, exceedingly small, oblong-ovoid, rich orange brown, with a raised network of golden yellow; embryo straight in axis of the endosperm.

Habitat.—Found in dry places throughout the northern United States, and extending northward to Hudson's Bay and Saskatchawan, and southward to Mississippi. It also occurs in Kamtschatka. It readily grows in English gardens, but has little beauty to recommend it in comparison with many other species of the genus.

Hook., Fl. Bor. Am., ii, p. 30; A. Gray, Man. Bot. U. S., p. 283; Chapman, Fl. South States, p. 254; Alph. DC., l. c., p. 380; Lindl., Med. Bot., p. 403.

Official Part and Name.—Lobelia. The dried flowering herb (B. P.). The flowering herb (*Lobelia*) (I. P.). Lobelia. The leaves and tops (U. S. P.).

Commerce.—The herb is imported into England from North America, usually in the form of compressed, oblong, rectangular cakes or packages, weighing from half a pound to a pound each, and from 1 to $1\frac{3}{4}$ inches thick. These packages are wrapped in paper sealed at the ends, and properly labelled with the name of the herb and of some herb-grower; they are usually prepared by the Shakers of New Lebanon. Lobelia is also occasionally found in commerce in an uncompressed state.

General Characters and Composition.—Lobelia of commerce, both from the packages and in an uncompressed state, consists of the dried herb cut up into pieces of varying sizes. Its colour is yellowish green; its odour somewhat irritating; and its taste after being chewed burning and acrid, very similiar to that of tobacco, and causing, like it, a flow of saliva. The powder has a greenish colour.

Lobelia seeds, from forming one of the best means for detecting

lobelia when death has been occasioned by its improper use, which has frequently happened, require a more detailed description. They have a brownish colour, and are very small, being on an average only $\frac{1}{30}$th of an inch long, by $\frac{1}{75}$th broad, and when viewed by a magnifying lens are seen to be oval or almond-shaped, and to have their surface marked with longitudinal and transverse ridges with intervening furrows, so as to resemble basket-work. Their powder is of a brownish colour, and communicates a greasy stain to paper.

The properties of lobelia are especially due to a liquid volatile alkaloid, which was first discovered by Professor Procter, who named it *lobelina*, and his observations were afterwards confirmed by Bastick in this country in ignorance of his experiments. The herb also contains traces of volatile oil, which was first obtained by Pereira and named by him *lobelianin*. Lobelia has also been examined by Enders at the desire of the authors of Pharmacographia, with a view to isolate the acrid principle to which it owes its taste, and he has discovered this substance in the form of warty tufts of a brownish colour. This has been termed *lobelacrin*; it is resolved by the influence of acids or alkalies into sugar and an acid called *lobelic acid*, which had been previously discovered by Pereira and afterwards examined by several chemists.

Medical Properties and Uses.—In *small doses* lobelia is expectorant and diaphoretic; in *full medicinal doses* it acts as a nauseating emetic; and in *excessive doses* its effects are those of a powerful acro-narcotic poison, producing great depression, nausea, cold sweats, and in some cases death. Its effects are very similar to those of tobacco; hence one of its commonest names, Indian tobacco. Waring says, as an emetic it is inferior to ipecacuanha in safety and certainty of operation. It is regarded by many as a medicine of much value in spasmodic asthma, and generally in affections of the air-passages where there is dyspnœa. As an addition to diuretic medicines it is believed by some practi-

tioners to have a useful effect. As a medicine lobelia should in all cases be employed with caution.

Per. Mat. Med., vol. ii, pt. ii, p. 9; Pharmacographia, p. 358; Per., by B. & R., p. 677; U. S. Disp., by W. & B., p. 533; Pharm. of Ind., p. 128.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Garden of the Apothecaries' Company, Chelsea.

1. Upper part of a plant.
2. A flower.
3. Corolla flattened out.
4. Vertical section of flower, corolla cut off.
5. Transverse section of ovary.
6. Ripe fruit.
7. Transverse section of same.
8. Seed.
9. Vertical section of same.

(2—7 enlarged; 8, 9 much magnified.)

M & N Hanhart Imp.

N. Ord. Ericaceæ. Lindl., Veg. Kingd., p. 453; Le Maout and Dec., p. 514.

Tribe *Arbuteæ*.

Genus Arctostaphylos,* *Adans.* B. & H., ii, p. 581. There are 15 species, natives of the cold parts of the northern hemisphere and of Mexico.

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163. Arctostaphylos Uva-ursi, *Sprengel, Syst. Veget.*, ii, *p.* 825 (1825).

Bear-berry.

Syn.—A. officinalis, *Wimmer.* Arbutus Uva-ursi, *Linn.*

Figures.—Woodville, t. 100; Hayne, iv, t. 20; Bigelow, i, t. 6; Steph. & Ch., t. 91; Berg & Sch., t. 20 e; Syme, E., Bot., vi, t. 881 (bad); Reichenb., Ic. Flor. Germ., xvii, t. 1147.

Description.—A small shrub, with decumbent much branched irregular stems; bark pale brown, scaling off in patches. Leaves evergreen, numerous, crowded, alternate, very shortly stalked, without stipules, ½ to 1 inch long, obovate, very obtuse at the apex, tapering at the base, quite entire, minutely ciliate when young, very thick, smooth on both surfaces, dark green and with a network of impressed veins above, paler and with a minute reticulation beneath. Flowers on short thick glabrous pedicels, few (3—15) together, forming short crowded drooping racemes or clusters at the ends of the branches; bracts very short, acute, thin. Calyx small, persistent, very deeply divided into 4 or 5 rounded, glabrous, thin, pinkish segments, with ciliate margins. Corolla gamopetalous, campanulate-urceolate, about ⅓ inch long, divided at the mouth into (4 or) 5 small triangular spreading teeth, smooth outside, hairy with crisp white hairs within, pale pinkish-white, the teeth rose-coloured. Stamens (8 or) 10, hypogynous, slightly united with the base of the corolla, filaments very short, somewhat flattened, hairy below, curved inwards, anthers 2-celled,

* *Arctostaphylos*, from ἄρκτος, a bear, and σταφυλή, a grape; given by Clusius, who thought it the Pontic plant called by Galen ἄρκτου σταφυλή. *Uva-ursi* is the Latin equivalent.

ovoid, turned downwards and thus appearing as if attached by the apex, chocolate colour, each cell with a large pore at the summit and a long spreading awn. Ovary superior, fleshy, 5-celled, with a single ovule in each cell, surrounded by a shallow annular disk with (8 or) 10 thickened, blunt lobes alternating with the stamens; style simple, thick, greatly exceeding the stamens; stigma terminal. Fruit small, globular, about ¼ inch in diameter, fleshy, smooth, bright red, with a thick skin, containing 5 somewhat kidney-shaped flattened bony pyrenes. Seed solitary in each pyrene, pendulous from its upper angle by a short funicle, embryo straight in the axis of the endosperm.

Habitat.—The Bearberry has an extensive distribution in the northern hemisphere. It is an abundant species in the subarctic regions of Europe, growing in healthy stony ground, especially in hilly countries; southward it extends along all the European mountain-chains except the Balkans, and eastwards it is found throughout Siberia to Kamptschatka. It grows in Iceland and Greenland, and in America is distributed throughout Canada and in the United States as far south as New Jersey and Wisconsin. In the British Islands it is common in Scotland, especially in the highlands, and extends south as far as Yorkshire; it grows also on the hills of the north-west of Ireland.

The pretty waxy-looking flowers come out in May, and the brilliantly coloured berries are ripe in the autumn.

Syme, E. Bot., vi, p. 27; Hook. f., Stud. Fl., p. 232; Watson, Comp. Cyb. Brit., p. 242; Koch, Syn. Fl. Germ., p. 546; Ledebour, Fl. Ross., ii, p. 909; Hook., Fl. Bor.-Am., ii, p. 37; A. Gray, Man. Bot. N. U. States; DC. Prod., vii, p. 584; Lindl., Fl. Med., p. 382.

Official Part and Names.—Uvæ Ursi Folia; the dried leaves (B. P.). The dried leaves (I. P.). Uva Ursi; the leaves (U. S. P.).

Collection.—Uva Ursi or Bearberry leaves should be collected for use in September or October; and in the British Pharmacopœia they are directed to be obtained from indigenous plants.

General Characters and Composition.—The dried leaves are dark

green, obovate, very shortly stalked, coriaceous, averaging about ¾ of an inch in length, and from ⅜ to ⅝ of an inch in breadth. The upper surface is smooth, shining, and somewhat convex; the under surface paler coloured, and minutely reticulated; and the margins entire and very slightly revolute. They have a strong astringent taste; and when powdered, a feeble hay-like odour.

The principal constituents of bearberry leaves are *tannic acid, gallic acid, arbutin, pyrocatechin, ericolin* and *ursone*. *Arbutin* is a bitter neutral substance, crystallising in acicular prisms, readily soluble in hot water, less so in cold; and also soluble in alcohol, but sparingly so in ether. *Ericolin* is an amorphous yellow substance, with a very bitter taste, and a peculiar, not unpleasant odour. It is obtained from the mother liquor from which arbutin has crystallised. *Ursone* is a colourless, tasteless, crystalline, neutral body, which melts and sublimes unchanged; it is obtained from the leaves by exhausting them with ether, in which it is slightly soluble. The medicinal properties of uva ursi leaves, so far as is known, are due to tannic and gallic acids.

Substitutions and Adulterations. — The leaves of *Vaccinium Vitis Idæa*, L. (*Red Whortleberry* or *Cowberry*), are sometimes substituted for, or mixed with, those of uva ursi, which they much resemble in shape. They are, however, readily detected by their margins being somewhat crenate towards the apex, and distinctly revolute; and their under surface dotted. They have also but a very slightly astringent taste; and their watery infusion is coloured green by ferric chloride (perchloride of iron), whereas the infusion of uva ursi leaves forms a bluish-black precipitate with perchloride of iron.

Box leaves have also some resemblance to those of uva ursi, but are at once distinguished by being devoid of astringency.

The leaves of *Chimaphila umbellata* (*corymbosa*) are also occasionally found mixed with uva ursi in the United States' markets. They may be readily distinguished by their greater length, serrated margins, and wedge-shaped base; they are described by us under *Chimaphila corymbosa*.

Medical Properties and Uses.—Uva ursi leaves have evident

astringent properties. They are also feebly diuretic in their action; and are reputed to have a specific effect in certain diseases of the urinary organs. They have been employed with advantage in irritable conditions of the genito-urinary organs, as chronic catarrh of the bladder, gleet, gonorrhœa, chronic cystitis, leucorrhœa, and other mucous discharges, &c. The infusion is the best form of administration.

Per. Mat. Med., vol. ii, pt. 2, p. 5; Per. Mat. Med., by B. & R., p. 675; Pharmacographia, p. 359; U. S. Disp., by W. & B., p. 878; Gmelin's Chemistry, vol. xv (1862), p. 419, and vol. xvi, p. 28; Chem. Gaz., Feb. 15, 1853, p. 61; Am. Journ. Pharm., vol. xxvii, p. 334; Am. Journ. Pharm., May, 1873, p. 197; Pocklington, in Pharm. Journ., ser. 3, vol. v, p. 301.

DESCRIPTION OF PLATE.

Drawn from a plant in the Botanic Garden at Edinburgh.

1. Portion of a plant in flower.
2. A flower.
3. Vertical section of the same.
4, 5. Stamen.
6. Pistil and disk.
7. Transverse section of ovary.
8. Fruit.
9. Transverse section of a "berry."
10. Side, and—12. Edge view of a pyrene.
11. Vertical, and—13. Transverse section of the same.
14. Seed.
15. Section of the same.

(2-7, 9-15 enlarged.)

D Blair ad nat del et lith

M & N Hanhart imp

GAULTHERIA PROCUMBENS, *Linn.*

N. Ord. Ericaceæ.

Tribe *Andromedeæ*.

Genus Gaultheria, *Kalm.** DC. Prod., vii, pp. 592—597.
Species 43, natives chiefly of America, a few Indian.

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164. Gaultheria procumbens, *Linn., Sp. Pl., ed.* 1, *p.* 395 (1753).

Wintergreen. Mountain Tea. Tea-berry. Checker-berry. Partridge-berry. Box-berry. Jersey Tea. Spice-berry. Ground Holly.

Syn.—G. humilis, *Salisb.* Gautiera repens, *Rafinesque.*

Figures.—Barton, t. 15 (not good); Bigelow, t. 22; Andr., Bot. Repos., t. 116; Bot. Mag., t. 1966.

Description.—A small creeping shrub; stem long, prostrate, very slender, with brown scaly bark, giving off root-fibres below, and above numerous erect branches, 3—6 inches high, naked and glabrous below, downy and with crowded leaves above. Leaves alternate, shortly stalked, 1—1½ inches long, oval but varying somewhat in width, tapering at base, acute at apex, thick, smooth, shining, sharply serrate, the serratures bristle-tipped. Flowers few, solitary from the leaf-axils; pedicels shorter than flowers, curved downwards, so that the flowers are pendulous, with two small broad bracts immediately below the calyx, crimson. Calyx saucer-shaped, deeply cut into 5 broad acute segments. Corolla urceolate, narrowed at the mouth, with 5 small spreading teeth, pale pink, waxy-looking, hairy within. Stamens 10, hypogynous, entirely included in the corolla; filaments curved, hairy; anthers 2-celled, each cell prolonged above into 2 awns, opening by a terminal pore. Ovary depressed, 5-lobed, smooth, 5-celled, surrounded at the base by a 5-lobed hypogynous disk, placentation axile; style simple, thick, longer than stamens. Fruit bright crimson-red, berry-like, sub-globular, the exterior formed

* Named to commemorate Dr. Gaultier, a physician of Quebec in the 18th century.

of the greatly enlarged and fleshy calyx, which surrounds the small thin-walled capsule, 5-celled. Seeds numerous, attached to the axis, small, slightly reticulated on the surface, embryo in the axis of fleshy endosperm.

Habitat.—This pretty little creeping shrub grows in shady woods, on sandy soil, especially in mountainous districts, in the southern parts of Canada and the northern United States, extending as far south as North Carolina. It is especially abundant in the pine-barrens of New Jersey. The whole plant has a pleasant aromatic flavour, and is evergreen, but the leaves frequently assume brilliant autumnal colouring. The structure of the so-called berry is very singular; the capsule itself is described by American writers as dehiscent with 5 valves; Salisbury considers it to be indehiscent, but rotting and crumbling away, when the placentas easily fall away from the axis. The plant was introduced into England by P. Miller in 1762 and is quite hardy here, flowering and fruiting almost throughout the year.

DC. Prod., l. c., p. 592; Hook., Fl. Bor. Am., ii, p. 35; A. Gray, Man. Bot. U. S., p. 293; Chapman, Fl. South. States, p. 261; Lindl., Med. Bot., p. 381.

Official Part and Name.—Gaultheria. The leaves (U. S. P.). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—The botanical characters of these leaves have been already given. They have a very peculiar, aromatic, agreeable odour and taste, and a marked astringency.

The aromatic properties reside in a volatile oil, which may be separated by distillation. It is commonly known in England under the name of Oil of Winter Green. A similar oil may be obtained from the bark of *Betula lenta* or Sweet Birch, and is also supposed to exist in other plants. It is the heaviest of all the known essential oils, having the sp. gr. 1·173, which character affords a convenient test of its purity. Gaultheria also contains tannic acid, to which its astringency is due.

Medical Properties and Uses.—Gaultheria possesses aromatic, stimulant, and astringent properties, and has been employed with benefit in chronic diarrhœa. It has also been used, but with doubtful advantage, as an emmenagogue, and with the view of increasing the secretion of milk. Oil of Gaultheria or Winter Green also possesses aromatic and stimulant properties, but it is chiefly used on account of its agreeable flavour to cover the unpleasant taste of other medicines.

Besides their medicinal use, an infusion of the leaves is employed in some parts of North America as a substitute for China tea, under the name of *Mountain* or *Salvador Tea.*

The fruits under the name of Partridge berries or Deer berries are much relished by some persons, and afford winter food to partridges, deers, and other wild animals.

Per. Mat. Med., vol. ii, pt. 2, p. 7; U. S. Disp., by W. & B., pp. 420 and 1307.

DESCRIPTION OF PLATE.

1. A flowering branch from the Garden of the Apothecaries' Society.
2. A branch with fruit from the Royal Gardens, Kew.
3. A flower.
4. Vertical section of the same.
5. Vertical section of ovary.
6. Transverse section of ovary.
7. A stamen.
8. Fruit.
9. The same with the enlarged calyx partly removed.
10. Transverse section of same.
11. Seed.

(4—7, 10 and 11 enlarged.)

M&N. Hanhart

CHIMAPHILA UMBELLATA, *Nuttall*

N. Ord. Ericaceæ.

Tribe *Pyroleæ*.

Genus Chimaphila,* *Pursh.* DC. Prod., vii, pp. 775. Species 3, natives of the northern parts of both hemispheres.

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165. Chimaphila corymbosa, *Pursh, Fl. Am. Sept.*, i, *p.* 300 (1814).

Winter-green. Pipsissewa. Princes Pine.

Syn.—Pyrola umbellata, *Linn.* Chimaphila umbellata, *Nuttall* (1818).

Figures.—Barton, i, t. 1; Bigelow, ii, t. 21; Steph. & Ch., t. 93; Woodville, vol. v; Hayne, xiii, t. 13; Fl. Danica, t. 1336; Bot. Mag., t. 778; Nees, Gen. Fl. Germ.; Schnitzlein, Iconogr., t. 161.

Description.—A sub-herbaceous or slightly woody perennial, with long running semi-subterranean shoots and ascending stems 4—10 inches high. Leaves evergreen, arranged in 1—5 irregular whorls which are closely placed on the short stem, very shortly stalked, lanceolate or obovate-lanceolate, tapering at the base, acute, serrate, thick, convex and glossy above, paler below. Flowers 4—8, forming a small terminal umbel or corymb, nodding on longish stalks, pedicels with narrow small bracts about the middle. Calyx small, with 5 blunt divisions, persistent. Petals 5, much longer than the calyx, rounded, concave, flesh-coloured. Stamens 10, hypogynous, free; filaments with a double curve, convex fleshy and much dilated with a fringed margin in their lower half, concave and filiform in the upper half; anthers violet-coloured, 2-celled, attached by their middle, opening by two round orifices at the narrow somewhat horned base, which, by a tilting-up movement of the filaments, becomes the apparent apex. Carpels 5; ovaries slightly connected laterally, arranged round the large conical spongy receptacle, walls thin, ovules very numerous, placed all over the large axile placentas; style very short, obversely conical, nearly immersed in

* Name from χεῖμα, winter, and φιλεῖν, to love, a translation of "winter green."

the cavity between the ovaries; stigma large, convex, faintly 5-lobed. Fruit a 5-celled globular capsule on an erect stalk, with thin pericarp dehiscing loculicidally. Seeds minute, very numerous, with a loose transparent cellular coat.

Habitat.—This pretty plant is not uncommon in dry woods throughout the north of Europe, reaching southward to Switzerland and South Germany, but more abundant in Scandinavia and Russia and extending into Siberia. It does not occur in Britain or Western Europe. In North America it is common, extending from Northern Canada to N. Carolina. It does not seem to be now in cultivation in our botanic gardens, but was formerly to be met with, having been introduced at Kew so far back as 1762. The main characters distinguishing *Chimaphila* from *Pyrola* are the dilated base of the filaments and the absence of any connecting web between the valves of the capsule, points hardly sufficient perhaps to warrant a generic separation.

DC. Prod., vii, p. 775; Hook., Fl. Bor. Am., ii, p. 49; A. Gray, Fl. U. States, p. 303; Chapman, Fl. South. States, p. 267; Lindl., Fl. Med., p. 375.

Official Part and Names.—Chimaphila, *Pipsissewa;* the leaves (U. S. P.). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—These leaves are somewhat lanceolate in outline, but broadest at their apex, and wedge-shaped at the base; and have a uniform shining green colour. These characters will distinguish them from the leaves of an allied species—*Chimaphila maculata,* or *Spotted Winter Green,* which are similar in outline, but rounded at the base and broader at that point than at their summit, and have a deep olive-green colour with greenish-white veins. When fresh and bruised they have a peculiar odour, but this is lost when they are dried, as in those of commerce; their taste is pleasantly bitter, astringent, and sweetish. Their infusion is rendered green by a solution of the perchloride of iron.

The leaves are alone official in the Pharmacopœia of the United

States, but all parts of the plant have active properties, and the leaves and stems are kept in the shops and frequently used together. The stem and root have a pungent taste combined with bitterness and astringency.

The more important constituents of Chimaphila are *tannic acid, resin, bitter extractive,* and a peculiar crystalline neutral principle which has been called by Fairbank *Chimaphilin.*

Medical Properties and Uses.—Chimaphila possesses mild tonic, astringent, and diuretic properties. It resembles Uva Ursi in its action, but is less astringent than it. It has been used in dropsies combined with great debility and loss of appetite; in chronic diseases of the urinary organs, as cystirrhœa and calculous complaints; and also in gonorrhœa, hæmaturia, &c. In the United States it has been regarded as more especially valuable in scrofula, from which circumstance it has even acquired the title of "King's Cure" in some of the States. Besides its use internally in scrofula, it has also been employed locally as a wash, in the form of a decoction, to unhealthy scrofulous sores.

Per. Mat. Med., by B. & R., p. 673; U. S. Disp., by W. & B., p. 256; Steph. & Church., Med. Bot., by Burnett, vol. ii, pl. 93; Fairbank, in Journ. and Trans. of the Md. Col. of Pharm., U. S., March, 1860; Somerville, in Trans. Med.-Chir. Soc. Lond., vol. v, p. 340; Paris's Pharmacologia.

DESCRIPTION OF PLATE.

The flowering plant drawn from a specimen collected in Sweden, the fruit from one collected in the Rocky Mountains, both in the British Museum.

1. A flowering stem.
2. A flower.
3. Diagram of flower.
4. Vertical section of same.
5. Transverse section of ovary.
6. Stamen with the anther in two positions.
7. A specimen in fruit.
8. A capsule.
9. A seed.

(2–6, 8 enlarged; 9 greatly magnified.)

L'Har FLS ad nat del et lith

M & N Hanhart imp

STATICE CAROLINIANA, *Walter*

N. Ord. PLUMBAGINEÆ. Lindl., Veg. Kingd., p. 640; Le Maout & Dec., p. 526.

Genus Statice,* *Linn.* (in part). B. & H., Gen., ii, p. 625. There are about 120 species described, found on the sea coast and salt deserts in most parts of the globe.

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166. Statice caroliniana, *Walter, Fl. Carolin., p.* 118 (1788).

Marsh Rosemary. Sea Lavender.

Syn.—S. Limonium, var., *A. Gray.*

Figure.—Bigelow, t. 25.

Description.—A perennial herb, with a thick, cylindrical, woody or fleshy, black, vertical rootstock, often branched at the top. Leaves all radical and tufted at the extremities of the branches of the root-stock, alternate but crowded together, without stipules, erect, 4—6 inches long including the long petiole which is somewhat dilated at the base, blade oblong-lanceolate or narrowly obovate-oblong, tapering into the petiole below, rather obtuse but usually strongly mucronate at the apex, entire, perfectly glabrous and shining, thick, with the midrib alone visible, dark green. Flowering stem (scape) about 1 foot high, erect, cylindrical, flexuose, smooth, hollow, quite leafless but with a few brownish scaly bracts, branched in the upper half, with a small bract at the base of each branch. Flowers small, numerous, sessile, either solitary or two together in a spikelet, surrounded closely by 3 semi-transparent chaffy bracts scarious at the margins, of which the innermost are twice as long as the others and pink on the back, spikelets sessile, all pointing upwards, arranged rather distantly on the slender, terminal, spreading branches of the large dichotomous, level-topped panicle formed by the branching of the scape. Calyx tubular-funnel-shaped, scarious, pinkish,

* *Statice*, στατική, the name of some astringent herb in the classical writers, was applied by the early botanists to the sea-pink or thrift, and adopted by Linnæus as a genus to include that and the sea-lavenders. The latter are now considered to form a separate genus, and the name *Statice* has been retained for it, whilst the sea-pink has become *Armeria maritima*.

strongly 5-ribbed, somewhat plicate, divided into 5 short triangular acute teeth, persistent. Petals 5, hypogynous, equal, obovate-spathulate, a little longer than the calyx, with a long claw, pale purplish blue. Stamens 5, opposite, and rather shorter than the petals, and adherent to them at the very base. Ovary oblong, prominently 5-lobed, smooth, 1-celled, superior, with a single ovule suspended from a funicle arising from the base of the ovary; styles 5, erect, quite distinct, shorter than the stamens, glabrous. Fruit (not seen) small, enclosed in the persistent calyx, pericarp membranous, indehiscent. Seed solitary, embryo straight, in scanty mealy endosperm.

Habitat.—This is a plant of salt marshes, and is common in such localities, on the borders of creeks and mud flats, on the whole coast of North America from Newfoundland to Carolina, but most commonly in the Northern States; it also grows in Texas. The flowers are produced in August and September.

S. caroliniana cannot be held to constitute a species distinct from *S. Limonium*, the common Sea Lavender of European shores, so abundant on our own coasts; and most American botanists now place it as a variety of that species. Its principal differences are found in its hollow stem with the branches more erect, the more distant flowers, which are more frequently solitary, and the sharper calyx-teeth. In all these points it agrees with *S. bahusiensis*, Fries (figured in Syme, E. Bot. vii, t. 1158), a plant found in northern Europe and in many places on the coast of England, which is now also usually placed as a variety of *S. Limonium*.

Boissier, in DC. Prod., xii, p. 643; A. Gray, Man. Fl. N. U. States, p. 312; Syme, E. Bot., vii, p. 162.

Official Part and Names.—Statice, Marsh Rosemary; the root of Statice Limonium, variety Caroliniana (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—The root, the official part, is described by Wood, as large, spindle-shaped or branched,

fleshy, compact, rough, of a purplish-brown colour, inodorous, and with a bitter, very astringent taste.

It has been analysed by Parrish, of Philadelphia, who found its constituents to be *tannic acid*, in the proportion of about 12 per cent., gum, extractive, albumen, volatile oil, resin, colouring matter, various salts, and other unimportant substances. Its properties are essentially due to tannic acid.

Medical Properties and Uses.—Marsh Rosemary or Statice is a powerful astringent. It is largely employed on this account in parts of the United States, more especially in New England, and is said to be applicable in all cases where kino and catechu are administered. But it is more commonly employed, in the form of infusion or decoction, as a local application to aphthous and ulcerative affections of the mouth and fauces; and is also reputed to be a valuable remedy both for internal and local use in cynanche maligna.

Uses of other Species of Statice.—The root of *Statice latifolia*, Sm. (*Statice coriaria*, Pall.), was exhibited in the collection of drugs sent from Russia to the International Exhibition, held in London in 1862. This root is remarkable for its large size and compact substance. The plant is abundant in the steppes of Southern Russia; and the roots are described as sometimes having a diameter of four inches and a half at the top, and being more than thirty feet in length. It has powerfully astringent properties, like that of *Statice caroliniana*, and has been employed to some extent as a tanning agent in Russia, but more especially for the same purpose in Spain.

A drug from Morocco, known under the name of *Tafrifa*, is is said by Leared and Holmes, to be the roots of *Statice mucronata*, L. This root varies from half to one inch in diameter, has a dull brown colour, and is marked with numerous transverse striæ, and a few scattered warts. Its cortical portion is whitish, thick, and spongy; and its meditullium whitish. It has a somewhat pungent and saltish taste. It is supposed to possess nervine properties.

U. S. Disp., by W. & B., p. 837; Parrish, in Amer. Journ. Pharm., vol. xiv, p. 116; Hanbury, in Pharm. Journ., ser. ii, vol. iv, p. 111; Leared and Holmes, in Pharm. Journ., vol. v, ser. 3, p. 522.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected in Massachusetts by Nuttall.

1. A plant in flower.
2. A flower surrounded with the bracts.
3. Vertical section of a flower.
4. Calyx laid open.
5. Petal and stamen.
6. Pistil.
7. Ovary cut open to show the ovule.

(2–7 enlarged.)

DICHOPSIS GUTTA.

D Blair FLS auct. del. et lith
M & N Hanhart imp

N. Ord. Sapotaceæ. Lindl., Veg. Kingd., p. 590; Le Maout & Dec., p. 535.

Genus Dichopsis,* *Thwaites.* B. & H., Gen., ii, p. 658. Species about 30, natives of the East Indies, especially Ceylon and the Malay Archipelago.

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167. Dichopsis Gutta.†

Gutta Percha. *Taban* (Malay).

Syn.—Isonandra Gutta, *Hook.*

Figures.—Lond. Journ. Bot., vi, t. 16, cop. in Miquel, Fl. Ind. Bat., ii, t. 36 A; De Vriese, De Handel in Getah-Pertja.

Description.—A large tree reaching 60 or 70 feet in height, with a trunk 2 or 3 feet in diameter, bark rather rough, reddish grey, young shoots with a very fine, close, reddish tomentum. Leaves closely placed, alternate, with deciduous stipules, spreading; petioles 1—2 inches long, cylindrical, stout, thickened at the base, smooth; blade obovate-oblong, shortly acuminate at the apex, much tapering at the base, entire, the margin very narrowly recurved and often somewhat undulated, glabrous and dull green above, densely coated beneath with a very fine, close, silky, shining, golden-orange tomentum, coriaceous, the midrib very thick and prominent beneath, the lateral veins fine, numerous, parallel. Flowers rather small, on short, recurved, golden-silky peduncles, arranged in numerous small clusters in the leaf-axils. Calyx campanulate, deeply divided into 6 ovate, obtuse segments, strongly imbricated in two rows, golden-silky, persistent. Corolla with a short tube scarcely longer than the calyx, and 6 oval, obtuse, spreading segments, pale greenish (?). Stamens 12, inserted in the throat of the corolla in one row, filaments equal, slender, exceeding the corolla-segments, anthers ovate, acute, 2-celled, extrorse, with longitudinal dehiscence. Ovary globose, slightly pubescent, 6-celled, with a single ovule in each cell, style

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* *Dichopsis*, apparently from δίχα, double, and ὄψις, form; unexplained.

† *Gutta*, the Malay name for gum or resin.

simple, slender, exserted, stigma terminal, obtuse. Fruit (not seen) reaching about 1½ inch long, ovoid, pointed, rusty-pubescent. Seeds not known.

Habitat.—This tree was first brought into notice about 1842 at Singapore, at which time its product began to attract attention. It was then abundant on that island, but during the next five or six years was persistently destroyed, and all but extirpated; at the present time there are at Singapore only a few trees carefully preserved as curiosities. In 1847 it was plentiful at Penang, but a similar fate has overtaken it there; the tree, however, must still be abundant in many parts of the interior of the southern parts of the Malay Peninsula, whence the gutta of commerce is now largely brought. It also grows in Borneo, especially the south-east coast, in Sumatra, and doubtless in other islands of the Malay Archipelago. Botanically the plant was made known in 1847 by the descriptions of Sir W. Hooker and Dr. Oxley, and to the memoir and figure of the former botanist we have, in default of complete specimens, had recourse for the above description of the flower. Since that date little has been added to our knowledge of the species, and the structure of the seeds is still unknown. It has been cultivated in Guiana, and at length there is a prospect of efforts being made to bring it into cultivation in our Eastern possessions. There is a small specimen in Kew Gardens which has never flowered.

De Vriese figures a narrow-leaved variety, var. *oblongifolia*, from a plant cultivated in the Leyden Garden.

We have followed, as usual, the authors of the 'Genera Plantarum' in placing this species under *Dichopsis*; its seeds, however, require examination.

Gutta Percha of various kinds and qualities is afforded by many other Sapotaceous trees, including, besides several species of *Dichopsis*, members of the genera *Chrysophyllum*, *Sideroxylon*, *Isonandra*, *Bassia*, *Payena*, *Mimusops*, and *Imbricaria*, all natives of the Malayan Islands or Peninsula, Cochin China, &c. Little has, however, been yet done towards referring the different commercial sorts to their botanical sources.

Oxley, in Journ. Ind. Archipelago, i, p. 22 (Jan., 1847); Hook., in Lond. Journ. Bot., vi, p. 464; Seemann, in Lond. Journ. Bot., iv, p. 86 (1852); Miquel, Fl. Ind. Bat., ii, p. 1038; Kurz, Forest Fl. Brit. Burma, ii, p. 120; De Vriese, De Handel in Getah Pertja (Leyden, 1856); Hance, in Journ Bot., 1876, p. 260.

Official Part and Name.—Gutta-Percha; the concrete juice of Isonandra Gutta, *Hooker* (B. P., *Additions*). Gutta-Percha; the concrete juice (U. S. P.). It is not official in the Pharmacopœia of India.

Preparation and Commerce.—The trunk of the tree abounds in milky juice, which, in order to obtain, the Malays have adopted the extravagant and wasteful mode of cutting down the trees. The bark is first stripped off, and the milky juice which then exudes is collected in a receptacle formed by the concave stalk of a plantain leaf, or of a cocoa-nut shell, or the spathe of a palm, or of some other suitable and readily obtained material. This juice quickly coagulates on exposure to the air, and forms the substance termed *gutta-percha*. The average quantity obtained from a tree has been estimated at about 20 pounds, and as about 40,000 cwt. were imported into this country in 1872, it follows that no less than 220,000 trees must have been destroyed to supply the English market alone. Owing to the wasteful method thus pursued for collecting gutta-percha, the tree has been exterminated at Singapore and Penang, and unless some other method, such as tapping the trees, be resorted to, the tree will also be extirpated from the other districts in which it is now found. As noticed, however, in our botanical description, commercial gutta-percha is now derived from several other Sapotaceous trees.

Gutta-percha is usually imported in blocks, each of which weighs from five to six pounds. Commercial gutta-percha is commonly contaminated with earthy and vegetable matters. It is purified by cutting it into shreds by machinery, and afterwards kneading in hot water. It may also be purified by means of chloroform; or by melting it with oil of turpentine, and afterwards straining and evaporating the solution. It is probably best purified by means of chloroform, a process for which is given

by Mr. F. B. Benger, in the 'Pharmaceutical Journal' for September, 1868.

General Characters and Composition.—Commercial gutta-percha is usually of a light brown or chocolate colour, but when quite pure it is white, or nearly so. Its specific gravity is 0·979. It is tough; flexible in thin pieces; insoluble in water, alcohol, alkaline solutions, and dilute acids; but almost soluble in chloroform, and entirely so in turpentine, carbon disulphide, and benzol. Its most important quality, that which renders it so useful in the arts, is the facility with which it softens and becomes plastic in hot water, or by dry heat. In this condition it may be readily moulded into any required form, or welded to other pieces which have been also rendered plastic by heat. On cooling it resumes its original hard and tough nature, and retains any form which may have been given to it. It becomes negatively electric when rubbed, and when dry is an insulator of electricity.

Commercial gutta-percha is composed of three distinct substances, viz. a milk white solid, *pure gutta,* forming from about 72 to 82 per cent. of the whole, which is soluble in chloroform, benzol, and ether, but insoluble in alcohol; a somewhat crystalline *white resin;* and an amorphous *yellow resin.*

Uses.—Gutta-percha is applied by the surgeon to many useful purposes. Thus when sheets of it are softened in hot water and applied to a limb, they harden in a few minutes into a perfectly fitting splint, and may thus be used to keep limbs and joints in fixed positions, and for all purposes where splints are required. It is also employed for the manufacture of various surgical instruments, such as catheters, bougies, specula, pessaries, and many others. In a softened state it is also used by the dental surgeon for stopping teeth. When dissolved in chloroform it has been employed as a dressing for wounds; for when a thin layer of this solution is spread upon the incised skin the chloroform rapidly evaporates, and leaves a film of hardened gutta-percha, which holds the edges of the wound firmly together. A compound solution of gutta-percha has been also used to form a kind of membrane to protect the skin against the action of contagious

poisons. The solution recommended by Acton for this purpose is prepared by adding a drachm of gutta-percha to an ounce of benzol; and ten grains of india rubber to the same quantity of benzol; each being dissolved at a gentle heat, and then mixing the solutions. This solution may be used to protect the hands in post-mortem examinations, to prevent excoriation of the cheek in gonorrhœal ophthalmia, and in many other ways. The official solution of gutta-percha may also be employed for similar purposes, and in various chronic affections of the skin, as psoriasis and other scaly and tubercular diseases.

In the arts the applications and uses of gutta-percha are most important and extensive. Thus, its being a non-conductor of electricity and its indestructibility in sea water, make it a most valuable application for coating the wires of submarine telegraphs; its imperviousness to water and great durability, renders it of great value for a number of purposes in which such qualities are required; while its plasticity when softened by heat makes it very useful for making buckets, pipes, ear trumpets, and a host of other articles. A detailed notice of the various economical applications of gutta-percha is not, however, within our province.

Per. Mat. Med., by B. & R., p. 1074; U. S. Disp., by W. & B., pp. 443 & 1255; Watts, Dict. Chem., vol. ii, p. 960; Ure's Dict. of Arts, Manufactures, and Mines, vol. i, p. 433; Hooker, London Journal of Botany for 1848, and Pharm. Journ., ser. 1, vol. vii, p. 179; Treasury of Botany, pt. 1, p. 630; Benger, in Pharm. Journ., vol. x, ser. 2, p. 160; Payen, Journ. de Pharm., ser. 3, vol. xxii, p. 183, and Chem. Gaz., vol. x, p. 353.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected at Singapore by Lobb (no. 290); the flowers added from Hooker and Fitch's drawings, the fruit from a specimen in the Kew Herbarium collected at Singapore by Maingay (no. 1947). 1. A branch with leaves and half-ripe fruit. 2. Vertical section of corolla. 3. Cluster of flowers. 4. Pistil. 5. Transverse section of ovary. 6. Ripe (?) fruit. (2, 4, 5 enlarged.)

DIOSPYROS EMBRYOPTERIS *Pers*

N. Ord. Ebenaceæ. Lindl., Veg. K., p. 595; Le Maout & Dec., p. 537.

Genus Diospyros,* *Linn.* B. & H., Gen. ii, p. 665. About 170 species are known, natives chiefly of tropical Asia, but some occurring in tropical and subtropical Africa and America.

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168. Diospyros Embryopteris,† *Persoon, Synopsis,* ii, *p.* 624 (1807).

Tindooka (Sanscrit), *Gāb, Gaub* (Bengal).

Syn.—Embryopteris peregrina, *Gaertn.* E. glutinifera, *Roxb.* Diospyros glutinosa, *Roxb.*

Figures.—Rheede, Hort. Malabar., iii, t. 41; Roxb., Plant. Coromandel, i, t. 70; Wight, Ic. Plant. Ind., tt. 843, 844; Beddome, Fl. Sylv., t. 69.

Description.—A tree of moderate size, reaching 35 feet high, with an erect trunk, and straight, spreading branches; bark black, with a scaly pellicle; young twigs usually glabrous, buds silky. Leaves persistent, alternate, without stipules, on smooth, short, thick petioles, 4—6 or more inches long, oblong or oval-oblong, rounded or slightly narrowed at the base, obtuse or acute at the apex, entire, smooth and shining on both surfaces, leathery, pale green, reticulated with veins, midrib prominent beneath. Flowers unisexual, dicœcious or polygamous; the male small, arranged 3—7 together in small axillary cymes, peduncles tawny-pubescent; the female much larger, sessile or shortly stalked, solitary or 2—5 together in small axillary cymes with caducous bracts. Male flowers:—Calyx shallowly cup-shaped, divided into 4 broad shallow lobes, pubescent; corolla campanulate, much exceeding the calyx, slightly hairy outside, smooth within, yellowish, cut into 4

* *Diospyros*, διόσπυρος, the name used by Theophrastus for *D. Lotus*, L., cultivated even in classical times in the Mediterranean region.

† *Embryopteris* was given as a generic name by Gaertner (who knew only the fruit), from some view, apparently erroneous, of the structure of the embryo.

spreading, shallow, imbricate lobes; stamens usually 40 (24—64 or more) inserted on the hairy receptacle or base of the corolla, equal, erect, included in the corolla, filaments very short, anthers linear, more or less hairy, 2-celled, dehiscing longitudinally; ovary not present. Female flowers:—Calyx deeply divided into four erect, broadly ovate, acute segments which are dilated and cordate at the base, smooth or pubescent, persistent; corolla campanulate, ½ inch or more long, smooth, divided nearly half way down into 4 cordate, blunt, overlapping, erect-patent segments, yellowish-white; staminodes variable in number, 1—12, usually 2—4, inserted on base of corolla, hairy; ovary smooth or hairy, glandular, 8—10-celled, with a single pendulous ovule in each cell; styles 4—6, spreading, divided into several pectinate stigmatic branches at the ends. Fruit shortly stalked, or nearly sessile, ovoid or subglobular, 1½—2 inches in diameter, surrounded at the base by the much enlarged and thickened spreading calyx, fleshy, nearly smooth or covered with a rusty mealiness, yellowish-orange, with a thin skin and viscid glutinous pulp, 6—10-celled. Seeds solitary in the cells, thin, flat, oblong; testa hard, separable; embryo small, straight, with a superior radicle and foliaceous cotyledons, in the axis of abundant cartilaginous endosperm.

Habitat.—This evergreen tree grows in Peninsular India, especially along the western coast, Assam, Ceylon, Siam, Burma, and Java, and appears to be sometimes cultivated. It is very variable in the form and texture of the leaves, as well as in the fruit. Though the latter has been long known it seems to have had no English name given to it. The sweet-scented flowers appear in March to May, and the fruit is ripe in December. There is a specimen in cultivation at Kew.

Hiern, in Trans. Cambridge Phil. Soc., xii (1873), p. 257; Brandis, Forest Fl., p. 298; Thwaites, Enum. Pl. Zeylan., p. 158.

Official Part and Name.—Diospyri Fructus; the fruit (I. P.). It is not official in the British Pharmacopœia or the Pharmacopœia of the United States. But as noticed below, the unripe

fruit of the American *Diospyros virginiana*, L., is official in the *Secondary List* of the U. S. P.

General Characters and Composition.—Although not specially so stated in the Pharmacopœia of India, the fresh and unripe fruit should alone be used medicinally. The characters of the fruit are briefly given in that volume as follows :—"About the size of a small apple, of a yellowish-rusty colour, covered with a rubiginous farina, eight-seeded, abounding with a viscid very astringent juice."

The fruit has not been satisfactorily analysed, but its properties are doubtless essentially due to *tannic acid*, like that of the fruit of *Diospyros virginiana* described below.

Medical Properties and Uses.—O'Shaughnessy was the first to speak strongly of the value of this fruit, in the form of an extract, as a powerful astringent. This preparation is now official in the Pharmacopœia of India, and is stated to be very useful in diarrhœa and chronic dysentery. A solution of the extract in water is also regarded as a valuable astringent injection in leucorrhœa. The juice of the fruit is likewise in use by the natives of some parts of India, as a local application to bruises and sprains.

Besides its medicinal use the fruit is eaten when ripe, but it is not much esteemed. The astringent viscid juice of the fruit is likewise used in Bengal, for daubing the bottoms of boats; and an infusion is also employed for steeping fishing nets in order to make them more durable. It is also said, by Hiern, to be used for bookbinding, since it preserves the backs from insects. This author also states that the wood of this tree yields a portion of the ebony of commerce; and that masts and yards of country vessels are made from it in Ceylon.

Pharmacopœia of India, pp. 131 and 455; O'Shaughnessy's Bengal Disp., p. 488; Pharmacographia, p. 360; Hiern's Monograph of Ebenaceæ, Cambridge (1873), pp. 29—31 and 259.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum collected in Ceylon by Thwaites (no. 1915); the fruit-section added from Roxburgh.

1. A branch with female flowers. 2. A female flower. 3. Corolla. 4. Section to show the pistil. 5. A male flower. 6. Section of the same. 7. A stamen. 8. Ripe fruit. 9. Section of the same showing the seeds. (7 enlarged.)

Diospyros virginiana, *Linn.*

Persimmon.

Official Part and Name.—Diospyros, *Persimmon;* the unripe fruit (U. S. P., *Secondary*).

General Characters and Composition.—The fresh unripe fruit of this tree, which is very common in the Middle and Southern States of America, has, like that of *Diospyros Embryopteris,* a very astringent taste. When analysed by Mr. B. R. Smith, of Philadelphia, its composition was found to be *tannic acid, sugar, malic acid, colouring matter,* and *lignin.* Mr. John E. Bryan, afterwards stated, that the *tannic acid* was not the kind that occurred in galls and oak bark; but Charropin, in a more recent analysis, says that the tannic acid found in it is the same as that existing in nutgalls, and that it also contains a large amount of *pectin, glucose,* and a *yellow colouring matter.*

Medical Properties and Uses.—Its properties and uses are the same as those of the unripe fruit of *Diospyros Embryopteris,* Pers. In the United States it is chiefly used in the forms of infusion, syrup, and tincture. An indelible ink is also made from the unripe fruit, in the Southern States.

The inner bark, which is very bitter and astringent, has also been used in intermittent fevers; and as a gargle in ulcerated sore throat.

The ripe fruit is edible, more especially after having been exposed to the frost. It is commonly known as the *Persimmon* or *Virginian Date Plum* in the United States. That of the sweet variety, *D. virginiana,* var. *dulcis,* is most esteemed, and is used as a table fruit; the former is only eaten by the negroes. The inhabitants of some of the States also gather the fruit and knead it into cakes with bran. These cakes are afterwards baked and mixed with tepid water, and used to make beer with the addition

of hops and yeast to produce fermentation. A spirit may be also distilled from the fermented infusion of these cakes. The fallen fruit is greedily eaten by both wild and domestic animals in the winter months.

U. S. Disp., by W. & B., p. 366; Pharmacographia, p. 361; Charropin, Etude sur le Plaqueminier (Diospyros), Thèse, Paris, 1873, pp. 28—30; Hiern's Ebenaceæ, pp. 30 and 226; Porcher's Resources of the Southern Fields and Forests of the United States, Charleston, pp. 423—427; Amer. Journ. Pharm., vol. xviii, pp. 161—167, and vol. xxxii, pp. 215—217.

D.Blair F.L.S ad nicc. del. et lith. STYRAX BENZOIN, *Dry.* M & N Hanhart imp

N. Ord. STYRACEÆ. Lindl., Veg. Kingd., p. 592; Le Maout and Dec., p. 541.

Genus Styrax,* *Linn.* B. & H., Gen., ii, p. 669. Species about 60, found in the warmer regions of both worlds; absent from Australia.

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169. Styrax Benzoin,† *Dryander, in Philos. Trans.*, lxxvii, *p.* 308 (1787).

Benzoin.

Syn.—Laurus Benzoin, *Houtt.* Benzoin officinale, *Hayne.*

Figures.—Phil. Trans., lxxvii, t. 12, cop. in Woodville, t. 102, and Steph. and Ch., t. 112; Nees, t. 211; Hayne, xi, t. 24; Berg & Sch., t. 9 f.

Description.—A moderate-sized tree, with a dense spreading crown, bark brownish-grey, rather smooth; young shoots densely covered with a reddish tomentum of stellate hairs. Leaves alternate, without stipules, on short petioles, 3—5 inches long, ovate, rounded below, somewhat attenuated and acuminate at the apex, irregularly denticulate or nearly entire, glabrous above when mature, with a thin floccose covering when young, bright green above, densely and finely tomentose and rufous white beneath, with prominent veins. Flowers rather large, numerous, on short, curved, stout, floccose pedicels which are curved upwards in one direction, laxly arranged on the divaricate branches of simple, one-sided, flat, long-stalked, axillary panicles, which about equal the leaves, bracts very small, deciduous. Calyx deeply cup-shaped, truncate, with 5 obscure denticulations, finely and closely tomentose, persistent. Corolla 3 or 4 times the length of the calyx, with a very short tube and 5 linear-oblong subacute segments, densely hairy and white externally, dull purplish-red, except the margin on the inside, valvate in the bud. Stamens 10, in one row, inserted at the very base of the corolla-

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* Styrax, in Greek στύραξ, the classical name of the Mediterranean species, *S. officinale*, Linn.; also of the resin afforded by its stem (see under no. 107).

† *Benzoin* is the name of the drug, and is said to be a corruption of the Arab name, *Lubán Jáwi*, signifying Java Frankincense; *Benjamin* is another form.

tube, the filaments connected for a short distance upwards, afterwards free, tapering, slightly hairy, anthers linear, longer than the filaments, adnate, erect, often curved backward, 2-celled, purplish. Ovary conical, very hairy, 3-celled when quite young, usually 1-celled when mature, ovules several, ascending from the base of the axis, style long, straight, exceeding the stamens, persistent, stigma small, 3-lobed. Fruit globular-depressed, slightly apiculate, supported on the hardened persistent flattened calyx, about $\frac{3}{4}$ inch in diameter, indehiscent, pericarp thick, very hard, reddish-brown, rather rough on the surface, and more or less covered with a scanty, yellowish-white, scurfy pubescence. Seed solitary, erect, filling the fruit, testa thick and hard, embryo straight in axis of copious endosperm.

Habitat.—This handsome tree is found wild abundantly in the island of Sumatra, especially in the hills of the interior, but plantations are made in many parts, and especially near the coast. The Benzoin-tree also grows wild in Java, and is found in Borneo and the Malay Peninsula, where it has been probably introduced; it is not known to occur in Siam, the source of the Benzoin from that country being probably different.

In constituting the genus *Benzoin* Hayne describes the anthers as 1-celled; this is an error; they are 2-celled, as in other species of *Styrax*.

Specimens are to be seen in the stoves of a few botanic gardens.

Marsden, Nat. Hist. Sumatra (1783), p. 123; Dryander, in Phil. Trans., lxxvii, p. 303; DC. Prod., viii, p. 260; Lindl., Fl. Med., p. 390; Flück. & Hanb., Pharmacogr., p. 361.

Official Parts and Names.— Benzoinum; a balsamic resin obtained from Styrax Benzoin (B. P.). A balsamic resin, procured by making incisions into the bark of the tree, and allowing the liquid which exudes to concrete by exposure to the air (I. P.). Benzoinum; a solid balsam obtained from Styrax Benzoin (U. S. P.). Acidum Benzoicum is also official in all the above Pharmacopœias.

Extraction and Commerce.—Benzoin is imported into Europe

and the United States from both Siam and Sumatra. Both kinds come in a great measure indirectly by way of Singapore and Penang. The botanical source of the former, although commonly attributed to *Styrax Benzoin*, has never been definitely determined; but that of the latter has been clearly ascertained to be from the plant now under description. Both sorts are generally imported in cubical blocks, this form being derived from their having been packed in wooden cases while the resin was still soft. In some cases these blocks are marked externally with the impressions of the mats in which they are placed when first collected, and in which they are brought to the ports of Sumatra. Siam benzoin is also very rarely imported in separate tears.

In Siam, according to Schomburgk, benzoin is derived by deeply incising the bark, when the resin exudes, and hardens between the wood and the bark, and is afterwards collected by stripping off the latter. The appearance of commercial benzoin from Siam indicates that some has thus been obtained; but it is at the same time equally clear that Siam benzoin must also be extracted by a different mode of procedure.

In Sumatra, benzoin is obtained as follows:—When the trees are from 6 to 7 years old, deep incisions are made in the bark, either longitudinally or somewhat oblique, and near the origin of the principal lower branches. The resin then exudes in a liquid state, but by exposure to the air and sun, it soon concretes and is carefully scraped off with a knife. Each tree yields about three pounds of benzoin annually, for the space of ten or twelve years, after which period the trees are cut down. That which exudes during the first three years is fuller of white tears, and is therefore of the best quality; that which flows subsequently during the next seven or eight years is browner, from containing fewer tears, and is less valuable; and after the tree is cut down the stem is split, and some benzoin scraped from the wood, which is of very inferior quality, being of a dark colour, and mixed with bark and other impurities. The terms *head*, *belly*, and *foot*, which are equivalent terms in the East to our words *superior*,

medium, and *inferior*, are applied by the Malays to these three qualities of benzoin. The relative values of head, belly, and foot are as 105, 45, and 18.

General Characters and Varieties.—The two commercial kinds of Benzoin, or as it is termed *Gum Benzoin*, are called Siam and Sumatra, from the countries whence they are derived.

1. *Siam Benzoin.*—This occurs in two forms, that is, either in *tears*, or in *masses of tears*; the former variety is, however, now very rarely or ever met with. The latter, termed *lump benzoin* or *amygdaloid benzoin*, when of the finest quality, is entirely composed of loosely agglutinated tears. These tears after keeping become reddish-brown and somewhat transparent on their surface; but when broken they have an opaque milk-white appearance internally. The tears are more or less flattened, and an inch or upwards in length. In other cases, and more commonly, the tears are agglutinated together into compact masses by a deep amber-brown or reddish-brown translucent substance; while in other specimens the tears are translucent, and the connecting material more or less opaque. Occasionally, again, the whitish tears are very small, and the proportion of brownish substance very large, so that the mass when broken presents somewhat the appearance of reddish-brown granite. The broken surface in those cases where the tears are large presents an almond-like appearance, hence the name of *amygdaloid benzoin*, which is frequently applied to lump benzoin. Siam benzoin is the best commercial variety; but, nevertheless, we find in nearly all samples a varying proportion of impurities in the form of bits of bark, wood, &c. In all cases the surface of the broken tears, which at first is opaque and milk-white, or translucent, becomes by exposure brownish. The cause which produces the varying conditions of translucency and opacity in the tears and agglutinating material is unknown. Siam benzoin is very brittle; easily softens by the heat of the mouth like mastich; and has very little taste, but an agreeable, balsamic, vanilla-like odour. When heated, it gives off a more powerful odour, and emits irritating fumes, which usually consist entirely or mainly of benzoic acid. It melts at about 167°; its

specific gravity varies from about 1·063 to 1·092; and it is soluble in rectified spirit and solution of potash.

2. *Sumatra Benzoin.*—This kind of benzoin always occurs in mass. As a general rule, it is of inferior quality to Siam benzoin; and has usually a greyer tint. It varies much in quality, as must necessarily arise from the mode of its collection which has already been described. Thus, in some specimens we have large opaque tears connected by a greyish-brown, translucent, agglutinating material, so that when broken the masses have an amygdaloid appearance; while in other cases the tears are small and few, when it presents a granite-like character. It is frequently much contaminated with pieces of wood, bark, and other impurities. Sumatra benzoin has a less agreeable and weaker odour than the Siam variety; its tears melt at about 185°, and the greyish-brown connecting substance at about 203°. In other characters it agrees generally with Siam benzoin.

In the London market a variety of Sumatra benzoin is commonly distinguished under the name of *Penang Benjamin* or *Storax-smelling Benjamin.* It consists essentially of large white tears, agglutinated together by an intermediate mass of a greyish colour. Its odour is different from that of all other varieties of benzoin, and hence may be readily distinguished from them. The authors of Pharmacographia suggest that it may possibly be derived from *Styrax subdenticulatum,* Miq.

Composition.—The principal constituents of benzoin are *benzoic acid* and *resin;* and in most samples some *cinnamic acid* has also been found. Benzoic acid exists in proportions varying from about 14 to 20 per cent.; the darker intervening translucent portions, as a rule, contain more acid than the opaque white tears; but whether this difference is constant remains to be proved. *Benzoic acid is official.* It is directed in the British Pharmacopœia to be obtained from benzoin by sublimation. As thus prepared, it is in light feathery crystalline plates and needles, which are nearly colourless, and have the agreeable odour of benzoin. It is sparingly soluble in water, but is readily dissolved by rectified spirit, or solutions of the caustic alkalies and

lime. It melts at 248°, and boils at 462°; and when heated to the latter temperature it passes off in vapour, leaving only a slight residue. *Cinnamic acid* is generally to be found to a small extent together with benzoic acid in samples of benzoin; although in some varieties no cinnamic acid has been detected; while in one specimen of benzoin, Aschoff found nothing but cinnamic acid, of which he obtained 11 per cent. The main constituent of benzoin is *amorphous resin*, of which there are at least three varieties, all of which agree essentially in their characters, but differ slightly in their relation to solvents. They have feebly acid properties, and are all soluble in alcohol.

Medical Properties and Uses.—Benzoin possesses stimulant and expectorant properties. It was formerly much employed in chronic bronchitis, and in other chronic affections of the lungs, &c. It has been used both internally and in the form of fumigation; but it is now but very little employed except as an ingredient of the official compound tincture of benzoin. The latter preparation, which is commonly known as *Friars' balsam*, is a very popular stimulant application to wounds and old ulcers.

Benzoin is chiefly used in the preparation of incense. It is also a frequent constituent of fumigating pastilles; and from the power it possesses of rendering fatty matters less prone to rancidity, it is an ingredient in the official benzoated lard.

Benzoic acid has been found most useful in cases of chronic inflammation of the bladder attended with phosphatic deposits in the urine. It is generally given in the form of benzoate of ammonia, which is more soluble than the free acid. It acts as a slight stimulant and diuretic, and under its influence the urine becomes more acid; it appears in the urine as hippuric acid. John Harley says he has seen benefit from its use in hepatic congestion and catarrhal jaundice. Recently, also, benzoic acid has been recommended as a valuable antiseptic. For this purpose H. Trimble states, that it is superior in many, if not in all, cases, to salicylic acid; and has the further advantages over this substance "of being more readily obtained in a state of purity, of being more soluble, and having a lower commercial value."

Per. Mat. Med., vol. ii, pt. 1, p. 683; Per. Mat. Med., by B. and R., p. 668; Pharmacographia, p. 361; U. S. Disp., by W. and B., p. 173; Marsden, History of Sumatra, 3rd edit., p. 134; Schomburgk, in Pharm. Journ., vol. iii, ser. 2, p. 126, from the Technologist; Annal. der Chem. und Pharm., cxix, p. 136; Pharm. Journ., ser. 2, vol. v, p. 77, from Journal de Pharmacie; Proc. Amer. Pharm. Assoc., vol. xxiii (1875), p. 162; Pharm. Journ., vol. vii, ser. 3, p. 383; Trimble, in Year Book of Pharmacy for 1877, p. 248, and Amer. Journ. Pharm., Aug., 1876, p. 347.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected by Zollinger in Java (no. 1381); the fruit added from a specimen in the collection of the late D. Hanbury.

1. A branch with opening flowers.
2. A flower.
3. Corolla laid open, four of the stamens removed.
4. Vertical section of calyx and ovary.
5. Transverse section of ovary.
6. Fruit.
7. Transverse section of the same.
8. A seed.
9. Section of the same.

(2–5 enlarged.)

D.Blair ad nat del et lith

FRAXINUS ORNUS, *Linn*

M&N Hanhart imp

N. Ord. Oleaceæ. Lindl., Veg. K., p. 616; Le Maout & Dec., p. 545.

Tribe *Fraxineæ*.

Genus Fraxinus,* *Linn.* B. & H., Gen., ii, p. 676. Over 30 species are described, natives of the warm and temperate countries of the northern hemisphere.

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170. Fraxinus Ornus,† *Linn., Sp. Plant., ed.* 1, *p.* 1057 (1753).

Manna Ash. Flowering Ash. Meleos (Greece).

Syn.—Ornus europæa, *Pers.*

Figures.—Woodville, t. 209; Fl. Græca, t. 4, cop. in Steph. & Ch., t. 53; Nees, t. 374; Hayne, xiii, t. 11; Berg & Sch., t. 3 e.

Description.—A small tree, not usually growing above 15 or 20 feet high, with a slender stem and a smooth, grey bark, with the leaf-scars strongly marked on the young twigs. Leaves opposite, decussate, 2 pairs only being usually produced on each flowering branch, without stipules, 6—8 inches long, stalked, pinnate, with 4 pairs of leaflets and a terminal one, rachis smooth, channelled above, leaflets very shortly stalked, 1½—2 inches long, oblong-oval, the terminal one often somewhat obovate, tapering at both ends but especially to the acuminate apex, finely serrate, thin, glabrous on both sides, except at the sides of the midrib at the lower part of the under surface, where are patches of whitish wool, bright light green. Flowers bisexual, small, very numerous, appearing with the leaves, on long, very slender pedicels, in little bunches irregularly arranged on the opposite branches of pinnately divided panicles, the largest of which terminates the flowering branches, and four other smaller ones come from the axils of the two pair of leaves, the whole forming a very elegant, drooping, feathery, compound panicle. Calyx deeply divided into 4 narrowly triangular, acute, erect segments, smooth, persistent. Petals about $\frac{1}{6}$ inch in length, 5 times as long as the

* *Fraxinus*, the Latin classical name for the Ash; in Greek, μελία.

† *Ornus*, a classical name for a wild mountain ash; applied to this species by some mediæval writers.

calyx and alternate with its segments, strap-shaped, acute, wavy, widely spreading, creamy white, deciduous. Stamens 2, hypogynous, alternating with the petals, filaments when fully grown nearly as long as petals, spreading, white, anthers dorsifixed, apiculate, at first ovoid and pale, after dehiscence brown, linear and twisted. Ovary ovoid, compressed, smooth, tapering into the style, 2-celled, with two pendulous ovules in each cell; stigma with two large papillose lobes opposite the cells of the ovary. Fruit (a samara) abundantly produced, pendulous, dry, indehiscent, scarcely an inch long, and about $\frac{1}{6}$ inch wide, compressed, with a terminal, flat, obovate-linear blunt wing. Seed solitary, pendulous, occupying the whole fruit-cavity, the other three ovules abortive but remaining attached to the side of the ripe seed; embryo straight in the axis of the endosperm, radicle superior, long, cotyledons flat.

Habitat.—A native chiefly of South-eastern Europe and Asia Minor, and extending, in the Mediterranean region, westward to Corsica and Eastern Spain. From its graceful appearance it is also planted in most European countries as an ornamental tree, producing its abundant flowers in early summer. It was first introduced to England by Dr. Uvedale, of Enfield, about 1710, and is now frequently cultivated in gardens. The cultivation of the Manna Ash for commercial purposes is carried on in Sicily, where regular plantations have been formed.

There is great variation in the form of the leaflets, and it is not unfrequent to find each one of the basal pair split up into two. *Fraxinus rotundifolia*, Lam., the leaves of which are figured in Hayne xiii, t. 12, from specimens in the St. Petersburg Herbarium, appears to be a form with more rounded leaves (or perhaps a young state), and not to constitute a distinct species.

Bertolini, Fl. Ital., i, p. 52; Boissier, Fl. Orient., iv, p. 39; DC. Prod., viii, p. 274; Hanbury, in Pharm. Journ., 1870, p. 326.

Official Part and Name.—MANNA; a concrete saccharine exudation from the stem of Fraxinus Ornus, *Linn.* and Fraxinus rotundifolia, *DC.* obtained by making incisions in the stems of

the trees, which are cultivated for the purpose (B. P.). A concrete saccharine exudation from the stem, obtained by incisions (I. P.). Manna; the concrete saccharine exudation, in flakes, of Fraxinus Ornus, and of Fraxinus rotundifolia (U. S. P.).

Extraction, Collection, and Commerce.—Manna was formerly obtained, as stated in the British and other pharmacopœias, from Sicily and Calabria, but the manna of commerce, as ascertained by Hanbury, is now exclusively collected in Sicily. For this purpose the trees are cultivated in plantations called *frassinetti.* When a tree is about 8 years old, and its stem not less than 3 inches in diameter, it is usually found to be in a sufficient state of maturity for the collection of manna. The stem generally continues to yield manna for 10 or 12 years, when it is cut down, and its place is ultimately taken by one or more shoots from the stump.

To obtain manna, transverse incisions from about 1½ to 2 inches in length and 1 inch apart, are made in the bark so as just to reach the wood, by means of a hooked or curved knife. One transverse cut is first made at the lower end of the tree near the ground, and a corresponding incision is made directly above this on the succeeding day, and this operation is repeated daily in warm weather, as long as the dry weather lasts, for dry and warm weather are necessary for a good harvest. In the following year similar incisions are made in a part of the stem which was untouched the previous year; and a similar operation is repeated in succeeding years, until the tree has been incised all round and is exhausted, when it is cut down as before noticed. The best time for making incisions into the trees is about July or August, at which period they have ceased to produce more leaves. From the incisions thus made in the stems manna exudes as a clear liquid which soon concretes on the stem, or on other substances placed for that purpose in the incisions. Hanbury says, that "Pieces of stick or straws are inserted in the incisions, and become encrusted with the very superior manna called *Manna a cannolo,* which, however, is unknown in commerce as a special sort. The fine manna ordinarily seen appears to have hardened on the stem of

the tree." According to Houel, flake manna is obtained during the height of the season, at which period the juice flows vigorously; and Stettner states that it is procured from the upper incisions, the juice being there less fatty than that in the lower part, and that consequently, it more easily dries in tubes and flat pieces. In the lowermost incisions small leaves of the ash are inserted to conduct the juice into a receptacle formed by a cup-shaped piece of the stem of the prickly pear (*Opuntia*), or on to tiles; this manna is more gummy and sticky, and less crystalline, and is of inferior quality. Some manna also of inferior quality is scraped off the stem after the finer flaky pieces have been gathered. After the manna has been removed from the tree, it is placed upon shelves to dry, and then packed for the market. In 1872 about 3500 cwt. of manna was exported from Sicily. It is commonly packed in deal boxes, having partitions, and frequently lined with tin plate.

General Characters, Varieties, and Composition.—Several kinds of manna have been described by pharmacologists, but only two are now commonly distinguished in this country; these are known as *Flake Manna*, and *Small Manna* or *Tolfa Manna*. Flake manna is the finest kind, and is alone official. It occurs in pieces which vary from 1 to 6 or even 8 inches in length, from 1 to 2 inches in width, and from $\frac{1}{2}$ to 1 inch in thickness. Their form is more or less stalactitic, owing to the slow exudation of the juice and the deposition of successive layers over one another. The pieces are commonly flattened or somewhat grooved on the side where they have adhered to the tree or substance upon which they have concreted, and on this side they are also generally soiled. They have a pale brownish-yellow colour on their inner surface, but are nearly white on their outer parts. Good Flake Manna is crisp, brittle, porous, and crystalline in structure, and readily soluble in about six parts of water; it has a faint odour resembling honey, and a honey-like taste, combined with a very slight acridity and bitterness. The smaller inferior pieces of manna are termed *Small Manna* or *Tolfa Manna*.

The principal constituent of manna is *Mannite* or *Manna-sugar*,

the quantity of which in the best varieties varies from 70 to 80 per cent., but the inferior sorts sometimes only contain about 60 per cent. A kind of sugar (*dextro-glucose*) is also present in manna, sometimes to the extent of 16 per cent., the fatty inferior mannas having the most. Manna likewise contains a very small quantity of a *red brown resin* with a sub-acrid taste and very unpleasant odour; and a faintly astringent, bitter, crystalline substance, called *fraxin*, which closely resembles *Æsculin*, and to the presence of which the fluorescence of an alcoholic solution of manna is due, as well as the greenish colour of some pieces of manna. The laxative constituent has been ascribed to extractive matter, and to the resin, but mannite possesses in itself similar properties to manna, and it is therefore doubtless to this that the medicinal property of manna is essentially, if not entirely, due.

Medical Properties and Uses.—Manna is a mild laxative. It is especially suitable for children and delicate persons; and also as an adjunct to more active aperients, in order to assist their action, and to disguise their disagreeable taste. Manna is, however, far less used in this country than formerly. Mannite possesses similar laxative properties to that of manna, and is frequently employed on this account in Italy.

Per. Mat. Med., vol. ii, part 1, p. 671; U. S. Disp., by W. & B., p. 547; Pharmacographia, p. 366; Hanbury, in Pharm. Journ., vol. xi, 2nd ser., p. 326, and vol. iii, 3rd ser., p. 421; Stettner, in Archiv der Pharm., vol. iii, p. 194; Pharm. Journ., vol. ix, 1st ser., p. 283; Hooker's Journ. of Bot., vol. i, p. 124; Cleghorn, in Trans. Bot. Soc. of Edin., vol. x (1868-69), p. 132; Buignet, in Journ. de Pharm., vol. vii (1867), p. 401, and vol. viii (1868), pp. 5-16.

DESCRIPTION OF PLATE.

Drawn from a specimen in Kew Gardens; the fruit from an oriental specimen in the British Museum. 1. A flowering branch. 2. A fully expanded flower. 3. Unopened anthers. 4 and 5. The calyx and pistil. 6. Vertical, and—7. Transverse section of the same. 8. Fruit. 9. Vertical section of the same and of the seed. 10. Fruit with a part of the pericarp removed, showing the ripe seed and the aborted ovules. 11. Transverse section of seed. (2–7, 10, 11 enlarged.)

D Blair FLS ad nat. del et lth.

FRAXINUS EXCELSIOR *Linn*

N. Ord. Oleaceæ.
Tribe *Fraxineæ*.
Genus Fraxinus, *Linn.*

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171. Fraxinus excelsior, *Linn., Sp. Plant., ed.* 1, *p.* 1057 (1753).

Ash.

Syn.—F. heterophylla, *Vahl.* F. monophylla, *Desf.* F. oxyphylla, *Bieb.* F. rostrata, *Guss.*

Figures.—Syme, E. Bot., vi, tt. 902, 3; Reichenb., Ic. Fl. Germ., xvii, t. 1072; Nees, t. 373; Hayne, xiii, 10; Nees, Gen. Fl. Germ., Gussone, Plant. Sicil. Rar., t. 63 (*F. rostrata*).

Description.—A large tree, 50—80 feet in height, with a tall, straight trunk, and curved ascending branches forming a rounded head, the young branches usually somewhat pendent; bark smooth and dull green when young, grey and cracked when old; buds large, nearly black, with large woolly scales. Leaves opposite, spreading, long-stalked, without stipules, about a foot long, pinnate, with 3—6 rather distant pairs of opposite leaflets and a terminal one, leaflets nearly sessile, 2½—3 inches long, ovate-lanceolate, variable in breadth, acute at the base, tapering at the apex, sharply but rather distantly serrate, smooth on both surfaces except when quite young, dark green above, pale beneath, often with a little woolly pubescence on either side of the midrib beneath. Flowers very small and numerous, polygamous (*i.e.* male and bisexual), on slender stalks arranged on the opposite branches of irregular panicles, several of which, 2—4 inches long, are given off in clusters from the axils of the scars of the leaves of the previous year; the panicles of male flowers shorter and denser than those of the bisexual ones. Calyx and corolla entirely absent. Stamens 2 (rarely 3 or 4), hypogynous, filaments very short, anthers oblong, 2-celled, dark purple. Ovary oblong, compressed, smooth, tapering into the style, three times the length of the stamens, 2-celled, with 2 ovules in each cell, stigma short, 2-lobed. Fruit copiously produced in large paniculate clusters, pendulous, nearly

1½ inch long, compressed, spathulate-oblong, the seed cavity occupying about half its length, the rest a tough blunt wing, brownish-yellow, ridged over the seed, structure as in *F. Ornus*. Seed as in that species.

Habitat.—The Common Ash is a frequent tree throughout this country in woods and copses, and though often planted is indubitably wild in most of its localities; it is thought, however, to be introduced in the North of Scotland. The curious little naked flowers appear on the last year's wood very early in the spring, often in February, and the fruit is ripe in late summer. A very singular variety is occasionally found wild, and is in cultivation, with short-stalked simple leaves and a shorter samara. It is figured in Syme, E. Bot., quoted above, and is the *F. monophylla*, Desf. (*F. heterophylla*, Vahl). There is also a drooping form.

The Ash is also found in all parts of Europe (except Greece), and extends into Northern Africa.

F. oxyphylla, Bieb., under which may be placed *F. rostrata*, Guss., figured in Guss., Plant. Sic. Rar., t 63, is a much smaller tree than *F. excelsior*, with but 3—4 pairs of smaller, thicker, and more glaucous leaflets, and smaller samaras attenuate at both ends. It grows in Spain, France, and Italy, the Crimea, Asia Minor, and Persia, and is cultivated at Castelbuono, Madonie, Sicily, for Manna. It must be considered as very doubtfully distinct as a species from *F. excelsior*, as is seen from the series in the Hanbury Herbarium from Prof. Todaro. In one of these the flowers are simultaneous with the leaves as in *F. Ornus*.

DC. Prod., viii, p. 276; Syme, E. Bot., vi, p. 56; Hook. f., Stud. Fl., p 238; Watson, Comp. Cyb. Brit., p. 246; Gren. & Godr., Fl. France, ii, p. 471; Bertoloni, Fl. Ital., i, p. 50; Boiss., Fl. Orient., iv. p. 39.

Parts Used.—The concrete saccharine exudation known under the name of manna, which is official in the British Pharmacopœia, the Pharmacopœia of India, and the Pharmacopœia of the United States, has been already fully described under the head of "Fraxinus Ornus." The plant now under notice is not official as a source of that substance, but in very warm summers we have

observed it produce to a slight extent a similar exudation in this country; and in warmer climates, as in some districts of Sicily, a small quantity of manna is ordinarily obtained from it, or, according to some botanists, as we have stated in our botanical description, from the very doubtfully distinct species, the *Fraxinus oxyphylla,* Bieb. The bark and leaves have also been employed in medicine.

Medical Properties and Uses.—This plant not only yields manna, as already noticed, the medical properties and uses of which have been described under *Fraxinus Ornus;* but the bark is regarded as tonic and febrifuge, and the leaves are reputed to possess cathartic properties. The medicinal properties of this plant must be, however, quite unimportant, as in no district are any products or parts of it, so far as we know, at present in use to any extent; but some years since the *leaves* were employed in France and Germany, in the treatment of gout and rheumatism, with, it was stated, a considerable amount of success. The leaves have also been recommended as a remedy in scrofula, and and as an antidote to the poison of serpents. Their value as a remedy in gout and rheumatism has been ascribed to the presence of *malate of lime,* of which they contain about 16 per cent.

It is as a timber tree, however, in which the value of this plant essentially consists. This is due on account of its rapid growth, and the toughness combined with elasticity and lightness of its wood. When young, then called Ground Ash, it is in common use for walking sticks, hop poles, and hoops; while the mature wood is employed for ladders, ploughs and other agricultural implements, handles for tools, and many other purposes.

Pharmacographia, p. 366; U. S. Disp., by W. & B., p. 1595; Treasury of Botany, pt. 1, p. 506; Bentl. Man. Bot., p. 581; Lindl. Flor. Med., p. 548; Pharm. Jl., ser. 1, vol. xiii, p. 132, from Dublin Medical Press.

DESCRIPTION OF PLATE.

Drawn from cultivated specimens. 1. Extremity of young branch with flowers. 2. A male flower. 3. A bisexual flower. 4. End of branchlet with leaves and fruit. 5. Vertical section of a fruit.

D. Bear ad sicc. del. et lith.

OLEA EUROPÆA. L

N. Ord. Oleaceæ.

Genus **Olea**, *Linn.** DC. Prod., viii, pp. 283—288. About 35 species are known, found in the warmer parts of both hemispheres, but chiefly in the old world.

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172. Olea europæa, *Linn., Sp. Plant., ed.* 1, *p.* 8 (1753).

Olive.

Syn.—O. Oleaster, *Hoffm. & Link.* O. lancifolia, *Moench.* O. gallica, *Mill.*

Figures.—Woodville, t. 98; Steph. & Ch., i, t. 15; Nees, t. 212; Hayne, x, t. 10; Berg & Sch., t. 33 b; Fl. Græca, t. 3; Nees, Gen. Fl. Germ., Gamop.

Description.—Usually a small, much-branched, evergreen tree, from 10—30 feet high, having somewhat the appearance of a white willow, but under favorable circumstances becoming much larger; branches numerous, slender, with opposite branchlets; bark greyish-white, nearly smooth. Leaves opposite, very shortly stalked, lanceolate or obovate-lanceolate, about 2—2½ inches long, rather variable in width, acute, tapering to the base, quite entire, the margin slightly recurved, texture coriaceous, smooth on both surfaces, the upper pale glaucous green, the lower silvery white, completely covered with a dense layer of minute, flat, stellate scales, which conceal the lateral veins. Flowers numerous, small, in simple or branched racemes in the axils of the older leaves, and shorter than them; inflorescence beset with stellate scales. Calyx deeply cup-shaped, small, pale green, smooth, with 4 shallow teeth. Corolla deeply cut into 4 (very rarely 5) oval, acute segments, much larger than the calyx, creamy white. Stamens 2, inserted on the tube of the corolla, and alternating with the segments; anthers very large, much longer than the short thick filament, anther-cells innate, curved, bursting outwards. Ovary superior, small, fleshy, 2-celled, about the length

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* The classical name; in Greek ἐλαία.

of the calyx, with 2 pendulous ovules in each cell; style short, stigma bifid. Fruit a drupe, from ½—1 inch in length, ovoid, usually pointed at apex, deep purple or nearly black; sarcocarp firm, fleshy, filled with oil; stone (putamen) thick, bony, narrowly ovoid, with a blunt keel down one side, acuminate, containing a single seed. Testa thin, membranous, veiny; raphe very distinct, running up one side within the putamen, and perforating its base; embryo straight, in axis of endosperm, cotyledons foliaceous, radicle superior.

Habitat.—The native country of the olive has been pretty certainly determined to be Asia Minor and Syria, but it has been a cultivated plant in parts of the Mediterranean region from very early times. At the present day very extensive districts are devoted to olive culture in Portugal, Spain, Italy, the South of France, and Algeria, and the tree is frequently found apparently wild in these and other countries. The olive orchards, covering many square miles of country, give a distinct character to large tracts of Spain and Italy. The trees are usually pollarded, and have none of the beauty of those left to grow naturally. The olive was long ago introduced into Peru and Chili. In England it flowers freely enough, and under favorable circumstances will even produce fruit, as in the late D. Hanbury's garden at Clapham Common, near London. It is hardier than the lemon.

As with other cultivated fruits there are several varieties of the olive; the largest are produced in Spain; in the wild state the fruit is very bitter. The tree flowers in spring and early summer, and the fruit is fully ripe in November.

DC. Prod., viii, p. 284; Bertoloni, Fl. Ital., i, p. 45; Gren. & Godr., Fl. France, ii, p. 474; Lindl., Fl. Med., p. 547.

Official Part and Name.—Oleum Olivæ. The oil expressed in the south of Europe from the ripe fruit (B. P.). The oil expressed from the fruit (*Olivæ Oleum, Olive Oil*) (I. P.). Oleum Olivæ. The fixed oil obtained from the fruit (U. S. P.).

Production, Commerce, and Varieties.—The ripe fruits which are

commonly known as *Olives*, are remarkable for the large quantity of fixed oil contained in their pulpy portion or *sarcocarp*. Thus, this portion when the olives are quite ripe yields about 70 per cent. of oil, and 25 per cent. of water.

The mode of extracting olive oil is somewhat modified in different countries, but consists essentially in submitting the crushed ripe fruit to moderate pressure. In France the finest oil is procured by crushing the fruit in the mill immediately after it is gathered, and then submitting the paste thus obtained, which is placed in coarse bags, to moderate pressure in a screw-press. The oil thus expressed is conveyed through tubs or other receptacles containing water, from the surface of which it is subsequently skimmed. This first product has a greenish tint, and is called *Virgin Oil*. After the oil has ceased to flow, the cake or marc is removed from the bags, broken up with the hand, moistened with boiling water, and submitted to increased pressure. The products are water, and oil of a second quality, which separates by standing. With the view of increasing the yield of oil, the olives are sometimes allowed to undergo incipient fermentation by being placed in heaps for a long time before they are pressed. The quality of the oil is, however, by this mode of procedure, much deteriorated; it is termed by the French *Huile fermentée*. A still inferior quality of oil is obtained by submitting the residues to pressure.

Various kinds of olive oil are known in commerce, as Provence oil, Florence, Gallipoli, Spanish, Sicily, &c. The Provence oil is the most esteemed. Italy produces annually about thirty-three million gallons of olive oil, representing a value of £8,000,000 sterling. The annual production of France has been estimated at about five and a half million gallons. The value of the oil imported into this country in 1872 was about £1,200,000. From Italy we received about one half of the whole quantity, from Spain about one fifth, and the remainder from other countries bordering on the Mediterranean.

General Characters and Composition.—Olive oil, which is also called *salad oil* and *sweet oil*, is an unctuous liquid of a pale

yellow or greenish-yellow colour, with a very faint agreeable odour, and when fresh having a bland oleaginous taste, but by long keeping it becomes slightly acrid. Its specific gravity varies somewhat, averaging at 63° Fahr. 0·916°. Olive oil is but very slightly soluble in alcohol, but it is soluble in about twice its volume of ether. The finer kinds of oil do not readily become rancid by exposure to the air, but the second qualities soon become so. At about 36° Fahr. olive oil begins to congeal, and at about 21° it separates into two portions, one solid, consisting of about 28 per cent. of the whole, which is commonly termed *margarine;* and the other fluid, forming about 72 per cent., and called *oleine.* The finer qualities of oil contain most oleine. Oleine by saponification yields *oleic acid* and a sweet principle termed *glycerine; margarine* also yields by saponification *glycerine* and *margaric acid,* which latter is sometimes regarded as a mixture of stearic and palmitic acids. Olive oil is not a drying oil, and therefore does not readily increase in consistence by exposure to the air.

Medical Properties and Uses.—Olive oil is demulcent, and in large doses mildly laxative. It is a frequent constituent of laxative enemas, especially when they are used in affections of the bowels. It is also employed as an antidote in cases of poisoning; it acts by enveloping the poison, sheathing the living surface, and thus mechanically obstructing absorption. Externally applied it is sometimes useful in preventing, or at least relieving, the ill effects produced by the sting of a wasp or bee. Thus, Dr. F. J. Farre says that "the obstruction which it causes to the absorption of poison is often very serviceable, and is sometimes sufficient to prevent any bad effects from following. I have often applied oil to the recent sting of a wasp or bee even after the pain had extended from the wounded finger to the entire arm, and have always found the pain cease after a few minutes. It has sometimes returned for a day or two immediately after washing the hands until oil was again applied to the wound." Olive oil is chiefly used externally, however, as an emollient vehicle for liniments and other external applications. It has also been applied externally in skin diseases to relieve pruritus; and in burns and scalds to

protect the surface from the action of the air. Smeared over the skin it has been sometimes thought to be a preventive of the plague.

Olive oil is also largely used in pharmacy in the preparation of the official Hard and Soft Soaps, and as one source of Glycerine.

As olive oil is not a drying oil, and not readily becoming rancid, it is very useful for greasing delicate machinery, more especially watches and clocks. For this purpose, however, the fluid portion or oleine is alone used. "To prepare it for the latter purpose the oil is cooled and the more liquid portion poured off, a piece of sheetlead is then immersed in this, and it is exposed in a corked bottle to the action of sunshine. A white matter gradually separates, after which the oil becomes clear and colourless, and is fit for use." (*Brande.*) Or, it may be obtained by pressing the solid portion of frozen oil between layers of bibulous paper, and then squeezing the paper under water, when the oleine collects upon the surface.

In the olive countries of Europe the oil is consumed to an enormous extent as a food substance, but in this country and in the United States its dietetical uses are very limited.

Other Products of the Olive Tree.—In warm countries a resin-like substance exudes spontaneously from olive trees. This was formerly described by Dioscorides as the tears of the Æthiopic olive; and in modern times it has been called *olive gum* or *Lecca gum.* Formerly it was thought to possess useful medicinal properties, but it is not now employed.

The leaves and the young bark have been employed externally as astringents and antiseptics, and internally as tonics in intermittents. According to Mr. Maltass, of Smyrna, a decoction of olive leaves made by boiling two handfuls in a quart of water until reduced to half a pint, has been very successfully used in the Levant in the treatment of obstinate cases of fevers. Others have also testified to the febrifuge properties of the leaves as well as to that of the bark.

Olive wood is beautifully veined, and has an agreeable odour; it is much esteemed by cabinet makers for these reasons, and on account of the fine polish of which it is susceptible.

The fruit of the olive is, however, by far the most useful product of the plant, for independently of its great value when ripe as the source of olive oil already fully described, it is much esteemed in its unripe condition as a dessert. For this purpose the green unripe fruits are first deprived of some of their bitterness by repeatedly steeping them in water, to which lime and wood ashes are sometimes added to shorten the process, and then preserved by bottling them in a slightly aromatised solution of salt. Several varieties of preserved olives are met with, but the most common are the small French or Provence olives, and the large Spanish olives. The kind called *Olives à la Picholine* are prepared by steeping olives in a solution of lime and wood ashes.

Per. Mat. Med., vol. ii, pt. i, p. 665; Pharmacographia, p. 375; Per. Mat. Med., by B. & R., p. 661; U. S. Disp., by W. & B., p. 606; Steph. & Church., Med. Bot., by Burnett, pl. 15, vol. i; Jl. Soc. Arts, May 22, 1868; Ph. Jl., Feb., 1854, p. 353.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected at Montpellier.

1. Branch in flower.
2. Section of flower.
3. Corolla laid open, with stamens.
4. Transverse section of ovary.
5. Ripe fruit.
6. Same with half the sarcocarp removed to show the stone.
7. Stone half cut away, showing the seed.
8. Section of seed.
9. Embryo.

(2, 3, 4 enlarged.)

ALSTONIA SCHOLARIS R.Br.

N. Ord. Apocyneæ. Lindl., Veg. Kingd., p. 599; Le Maout and Dec., p. 548.

Tribe *Plumerieæ*.

Genus Alstonia,* *R. Br.* B. & H., Gen., ii, p. 705. There are 30 species, natives of the tropics of the old world.

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173. Alstonia scholaris,† *R. Brown, in Mem. Werner. Soc.*, i, *p.* 76 (1811).

Chatiūm, Satiūm (India).

Syn.—Echites scholaris, *Linn.* A. cuneata, *Wall.*

Figures.—Rheede, Hort. Malabar., i, t. 45; Rumph., Herb. Amboin., ii, t. 82; Wight, Ic. Plant. Ind., ii, t. 422; Beddome, Fl. Sylvatica, t. 242.

Description.—A tree attaining a height of 40—60 or even 80 feet, with a tall trunk and spreading whorled branches; bark dark grey, uneven, and rough, with many lenticels on the younger branches. Leaves in whorls of 5—7, spreading, very shortly stalked, 4—8 inches long, lanceolate or obovate-oblong, bluntly acuminate, entire, tapering below, coriaceous, midrib very prominent beneath, lateral veins numerous, transverse, parallel, quite smooth, green and shining above, pale and dull beneath. Flowers small, shortly stalked, in small clusters, combined into compact long-peduncled rounded paniculate cymes, 8—12 of which are arranged in large stalked umbels, one or more of which terminate the branchlets; bracts opposite, or whorled, ovate and with the branches pilose with fulvous hairs. Calyx cup-shaped, deeply divided into 5, rounded, very obtuse, pubescent, imbricate lobes. Corolla greenish-white, the tube 4 or 5 times the length of the calyx, lined throughout with close reversed hairs, narrow and glabrous outside below, inflated and pilose at the top, greatly contracted at the mouth, which is closed by a tuft of strong hairs,

* In honour of Dr. Charles Alston, Professor of Botany in the University of Edinburgh, who died in 1760.

† The "lignum scholare"; so called from the use of the wood for making the writing tablets used in schools (see Rumph., Herb. Amboyn., ii, p. 247).

limb scarcely $\frac{1}{4}$ inch across, divided into 5 ovate, rather truncate, flat, spreading lobes, hairy on both sides, and convolute in æstivation. Stamens 5, inserted in the inflated portion of the corolla tube and alternating with its lobes, filaments very short, anthers pointed, sagittate, 2-celled, introrse, dehiscing longitudinally. Pistil composed of two carpels, ovaries slightly united, densely covered with white hairs, style single, long, filiform, thickened at the summit, and dilated into a double rounded knob immediately beneath the two short filiform stigmas. Fruit of two (one by abortion) cylindrical, pendulous, somewhat divaricate, linear, slender, smooth, brown follicles 6—12 inches long, hanging in clusters. Seeds very numerous, oblong, dorsally compressed, $\frac{3}{10}$ inch long, pale orange, slightly rough, marked down one surface with a shallow furrow with the minute hilum in the centre, furnished at both ends with long, radiating, silky, pale orange hairs (coma); embryo straight in the axis of the endosperm, with a superior radicle and flat oblong cotyledons.

Habitat.—This fine forest tree is common throughout India, and extends to Ceylon, Burmah, Java, the Philippines, New Guinea, and Queensland in Australia; it is also found in Western Tropical Africa. It flowers in December—March. A bitter milky juice fills the tree. There is a plant in the Royal Gardens at Kew.

DC. Prod., viii, p. 408; Brandis, Forest Flora, p. 325; Benth., Fl. Austral., iv, p. 312.

Official Part and Name.—Alstoniæ Cortex; the bark (I. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of the United States. Its local name in India is *Satween.*

General Characters and Composition.—Alstonia bark, or as it is termed by the natives of the Philippines *Dita bark,* is found in irregular more or less twisted pieces, with a spongy texture, and varying usually in thickness from about $\frac{1}{8}$ to $\frac{1}{2}$ an inch; it breaks easily with a short coarse fracture. Its external surface is very rough and uneven, and of a dark grey or brownish hue; within this the substance of the bark generally, as well as its

inner surface, is of a bright buff colour. It has a very pure bitter taste, being neither aromatic nor acrid; but is devoid of any marked odour.

A few years since, Gruppe, a pharmacien of Manilla, obtained from this bark an uncrystallizable, very hygroscopic, bitter substance, to which he gave the name of *ditaïn*. The bark was found to yield about 2 per cent. of this principle, which he regarded as its active constituent, and when tried at Manilla was said to be a perfect substitute for quinine. M. Hildwein afterwards found that this ditaïn was by no means a pure principle, but apparently a mixture of crystallizable substances and colouring matter. Ditaïn was subsequently examined by Gorup-Besanez, who obtained from it a very small quantity of a crystallizable substance, which appeared to possess all the characters of an alkaloid. J. Jobst and A. Hesse, who have still more recently conducted a very thorough chemical investigation of dita bark, have succeeded in isolating an alkaloid, which they have named *ditamine*. They believe that the alkaloid extracted from ditaïn by Gorup-Besanez to be identical with ditamine. The very small quantity of alkaloid obtained by the latter chemist from ditaïn corresponds also with the results of their experiments upon dita bark. They also believe, that as a material for the preparation of its characteristic alkaloidal salts, dita bark has no future before it; and further, that if its antifebrile action be generally established, this action could hardly be attributed to the small quantity of alkaloid it contains.

Medical Properties and Uses.—In India and in the Philippines, alstonia bark is regarded as a valuable antiperiodic and tonic. It has also been reputed to possess anthelmintic properties. Recently, as already stated, the so-called ditaïn has been extravagantly vaunted in Manilla as a substitute for quinine. Waring says that it has proved valuable in chronic diarrhœa and in the advanced stages of dysentery. It has also been regarded as an efficient remedy in debility after fevers and other exhausting diseases. According to Waring, it is a remedy of considerable promise.

Pharmacographia, p. 378; Gibson, in Pharm. Journ., ser. 1, vol. xii, p. 422; Waring, Pharmacopœia of India, p. 137; Pharm. Journ., ser. 3, vol. iv, p. 70; Jobst & Hesse, in Pharm. Journ., ser. 3, vol. vi, p. 142, from Annalen der Chemie, vol. clxxviii, p. 49; Proc. Amer. Pharm. Ass., vol. xxii, pp. 111 and 273, from N. Rep. Ph., 1873, Nos. 8–9, pp. 561–563; Proc. Amer. Pharm. Ass., vol. xxiv, pp. 136 and 366, from N. Rep. Ph., No. 2, 1876, pp. 76–106.

DESCRIPTION OF PLATE.

Drawn from specimens in the Kew Herbarium collected in Travancore and Kumaon.

1. End of a flowering branch.
2. A flower-bud.
3. Section of a flower.
4. Anther.
5. Ovary.
6. Upper part of style and stigmas.
7. Fruit.
8. A seed.
9. Transverse section of the same.

(2–6, 9 enlarged.)

M&N Hanhart

HEMIDESMUS INDICUS, *R Br.*

N. Ord. ASCLEPIADACEÆ. Lindl., Veg. K., p. 623; Le Maout & Dec., p. 551.

Tribe *Periploceæ.*

Genus Hemidesmus,* *R. Br.* DC. Prod., viii, p. 494. Species 3, natives of India.

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174. Hemidesmus indicus, *R. Brown, in Mem. Werner. Soc., i, p.* 56 (1811).

Nunnari. Indian Sarsaparilla.

Syn.—Periploca indica, *Willd.* P. emetica, *Retz.* Asclepias Pseudo-Sarsa, *Roxb.*

Figures.—Rheede, Hort. Malab., x, t. 34; Delessert, Ic. Select., v, t. 55; Wight, Ic. Pl. Ind. Or., ii, t. 594; Burman, Thes. Zeylan., t. 83, f. 1.

Description.—A twining shrub with numerous very slender, woody, diffuse, smooth stems, and a slender, slightly branched, tortuous root; branches much elongated, whip-like, simple, smooth. Leaves opposite, very shortly stalked, dark-green, smooth, shining, variable in form, ovate, oval, oblong, lanceolate or almost linear, usually broadest on the upper branches, acute at the apex, margin entire; stipules very small, caducous. Flowers small, in little clusters of 5 or 6 in the axils of the leaves, shortly stalked, the pedicel with several imbricated, acute, ovate, minutely laciniated bracts, Calyx very deeply divided into 5 ovate, acute segments with a strong midrib, finely ciliated, imbricate. Corolla rotate, very deeply 5-cleft, the segments ovate, acute, valvate, texture leathery, deep purple and wrinkled within, green outside, the short tube with a prominent laterally compressed rounded ridge alternating with the segments. Stamens 5, inserted at the very base of the corolla-tube immediately behind the prominent ridges; filaments long, slender, free for their whole length,† connectives wide, prolonged beyond the anthers into

* Name from ἡμί, half, and δεσμός, a bond, from the partial connection of the stamens.

† So in the specimen examined. Brown, however, found them "basi connata," and this is probably their usual condition.

triangular inflexed appendages, which are united by their margins to form a horizontal cover to the stigma; anther-cells small, in contact with but free from the stigma, smooth; pollen collected into masses, 2 in each cell, and becoming attached in fours to the dilated apex of each angle of the stigma. Ovaries 2, small, compressed; styles united to form a short, thick, tapering body; stigma large, thick, capitate, bluntly pentagonous, smooth, the top slightly raised in the centre. Fruit of 2 widely divaricated follicles, about 4 inches long, straight, linear, tapering, smooth, dehiscing along the ventral suture. Seeds numerous, overlapping, elongated, brownish-black, provided with a long tuft of white hairs at the hilum; embryo straight, in scanty endosperm.

Habitat.—This grows throughout the Indian Peninsula, and is a common and well-known plant, being found in uncultivated places everywhere. The great variety in the form of the leaves is remarkable, and led the native Hindoos to make two species of the plant, but every variety of leaf may be found on stems coming off from one root.

Roxb., Fl. India, ii, p. 39; Decaisne, in DC. Prod., viii, p. 494; Lindl., Fl. Med., p. 543.

Official Part and Name.—Hemidesmi Radix; the dried root (B. P.). The root (*Hemidesmi Radix*) (I. P.). It is not official in the Pharmacopœia of the United States.

General Characters and Composition.—Hemidesmus root is imported from India. It is commonly known under the name of *Indian Sarsaparilla;* and also in India as *Nunnari Root.* It occurs in pieces of various lengths, but rarely less than 6 inches; and commonly from about $\frac{1}{3}$ to $\frac{1}{2}$ an inch in thickness, although thicker roots are sometimes to be found. The roots are more or less twisted, unbranched or furnished with a few small rootlets, cylindrical, furrowed longitudinally, and the cortical portion divided transversely so as to form annular cracks. It has a yellowish-brown or dark brown colour externally; a peculiar fragrant odour, resembling that of melilot or the tonquin bean; and a sweetish agreeable taste, combined with a very slight

acridity. A transverse section shows that the root is composed of a thin cortical portion, which is of a corky texture, somewhat mealy, and commonly of a white or brownish colour; and a yellowish woody centre (*meditullium*), which is separated from the cortical portion by a narrow dark wavy ring, representing the cambium layer.

The root as found in commerce is frequently of bad quality, and in many cases has portions of the aerial stems attached; these are almost tasteless and inodorous, and inferior in properties to the root. Waring says that the fresher the root the greater is its efficacy.

No satisfactory chemical examination of hemidesmus root has as yet been made. Its properties are said to depend upon a volatile oil and a peculiar crystallisable principle called *hemidesmine;* but according to Christison and Dr. Scott, of Madras, the latter substance is only a stearoptene.

Medical Properties and Uses.—In India it is regarded as possessing similar properties to sarsaparilla, and is employed as a substitute for that substance, as an alterative, tonic, diuretic, and diaphoretic. Waring, in the Pharmacopœia of India, speaks highly of its value, more especially of that of the fresh root; but in this country and in the United States of America it is but little esteemed.

Per. Mat. Med., by B. & R., p. 660; Pharmacographia, p. 379; U. S. Disp., by W. & B., p. 451; Pharmacopœia of India, pp. 140 and 457.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum, collected at Tranquebar and Ceylon. 1. A young flowering stem. 2. Portion of another branch, with fruit. 3. A single flower. 4. Base of corolla, showing the androecium. 5. Summit of the androecium, showing the united anther-processes. 6. Calyx and pistil (the ovaries and styles should have been shown to be separated). 7. Anther in the bud. 8. Hooded appendix, containing the pollen masses. 9. The same expanded. 10. A seed. (3–6 enlarged; 7–9 after Delessert.)

M & N Hannart imp

D'Blair ad. S ad nicc. del. et lith.

SOLENOSTEMMA ARGEL. *Hayne*

N. Ord. Asclepiadeæ.

Tribe *Cynancheæ.*

Genus Solenostemma,* *Hayne.* B. & H., ii, p. 749. The following is the only species,

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175. Solenostemma Argel,† *Hayne, Darst. und Beschr. Arzn. Gewächse,* ix, t. 38 (1825).

Syn.—Cynanchum Argel, *Del.* C. oleæfolium, *Nectoux.* Argelia Delilii, *Decaisne.*

Figures.—Delile, Flore d'Egypte, t. 20, f. 2, cop. in Hayne, ix, t. 38; Nees, Supp.; Berg, Characterist., t. 31, f. 244; Nectoux, Voy. haute Egypte, t. 3.

Description.—A perennial herb, somewhat shrubby at the base, reaching about two feet high, with straight, wand-like, white, smooth, somewhat quadrangular branches. Leaves closely placed, opposite, shortly stalked, lanceolate, entire, subacute, with a very fine white puberulous covering, fleshy, pale glaucous green. Flowers numerous, small, shortly stalked, rather densely arranged in irregular, dichotomous, stalked, corymbose cymes from the axils of the leaves, and about as long as them. Calyx cut almost to the base into 5 linear-lanceolate, acute, pubescent segments. Corolla with a very short tube and 5 erect, narrowly oblong, valvate lobes, smooth, white, more than twice as long as the calyx. "Corona" cup-shaped, petaloid, attached to the base of the corolla, deeply cut into 5 rounded, obtuse, somewhat spreading lobes, opposite the corolla segments. Stamens 5, inserted at the base of the corolla, just within the "corona," with which they are not combined; filaments united into a long narrow tube, enclosing the ovaries and style; anthers about ⅓ the length of the filaments, in close contact but not united, terminating in triangular, flat, membranous appendages which are inflexed over the stigma, cells vertical, pollinia oblong, compressed, pendulous from their attenuated upper ends. Ovaries 2, distinct, small, tapering; style

* *Solenostemma,* from σωλήν, a tube, and στέμμα, a crown; the corona and anthers being connected by the staminal tube.

† *Argel,* the Nubian (Arabic) name of the plant.

single, very slender; stigma capitate, thick, closely surrounded by the anthers, 5-angled, the top flat or depressed. Fruit of 2 follicles (one often abortive), 1—2 inches long, ovate-ovoid, pointed, thick, smooth, pale, sometimes mottled. Seeds numerous, with a tuft of hair at the end.

Habitat.—This plant inhabits Upper Egypt and Nubia, and has also been found in the northern parts of Arabia. It must be a common plant in some districts, but has not been often collected by botanists, and specimens are somewhat rare in herbaria. Rocky places are the usual localities, and the small white flowers are produced in July.

The nature of the part of the flower in this Order called the "corona" is uncertain, being by some botanists considered to be staminal, by others as part of the corolla; it varies very greatly in form and connection with the stamens, and may be double, or rarely, as in *Hemidesmus*, absent. Another peculiarity of *Asclepiadeæ* is the agglomeration of the pollen-grains into little masses called pollinia, one or two of which are contained in each anther-cell, and afterwards become attached in different methods to the glandular "corpuscles" developed at each angle of the stigma. The term "gynostegium" is often applied to the more or less combined body formed of the anthers and stigma.

Decaisne, in Ann. des Sc. Nat., ser. 2, ix, p. 331, and in DC. Prod., viii, p. 533; Boissier, Fl. Orient., iv, p. 56.

Part Used and Name.—Argel; the leaves. These leaves are not used in medicine, but are described here in consequence of their forming the principal adulteration to which Alexandrian Senna is liable, as we have stated under *Cassia acutifolia.*

Collection. — Argel leaves are principally collected by the Arabs in the valleys of the desert to the east and south of Assouan in Upper Egypt, from which town, according to Rouillure, they were formerly forwarded in large quantities to Boulak, the port of Cairo, for the purpose of being mixed with true senna leaflets to form the Alexandrian Senna of commerce.

General Characters and Composition.—Dried argel leaves, as

found in Alexandrian Senna, are lanceolate in outline, equal-sided at the base, greyish-white, opaque, thick, coriaceous, rigid, somewhat crumpled, wrinkled, very finely pubescent, and with very indistinct veins. They vary in length, but are commonly longer than the senna leaflets with which they are mixed. They have no marked odour, but a very evident and disagreeably bitter taste.

No recent analysis has been made of Argel leaves, but, according to Dublanc, jun., they contain a little *volatile oil;* a bitter nauseous *extractiform matter,* in which their properties appear to essentially reside; *chlorophyll; gummy matter,* analogous to bassorin; *fatty matter;* a *glutinous substance; acetate of potash;* and *mineral salts.*

Medical Properties and Uses.—There have been various opinions expressed as to the medical properties of Argel leaves; thus, according to Rouillure, Delile, Nectoux, and Puguet, they are more purgative than senna leaflets; and Rouillure and others distinctly state that the Arabs of Upper Egypt and Nubia employ them as a purgative without previously adding them to senna. Heberlein, on the contrary, states that a watery infusion of the leaves had no appreciable effect, either as a purgative or in any disagreeable way. The more common belief now entertained of their action, which is especially founded upon the experiments of Christison, is, that they possess little or no purgative effect, but cause sickness, griping, and other unpleasant symptoms; hence, many have concluded that the griping and sickness commonly caused by Alexandrian Senna were due entirely to the Argel leaves it contained; but this is undoubtedly an error, for senna of itself, when free from admixture with Argel leaves, usually causes some griping and sickness. Doubtless, however, these disagreeable effects of senna are more marked when it is mixed in any quantity with Argel leaves. It is, however, well known, that some persons prefer senna which contains a large proportion of Argel leaves, and therefore regard the systematic admixture of Argel leaves with senna as improving that drug.

Adulteration of Alexandrian Senna with Argel leaves.—Whatever conflicting opinions may be entertained in reference to

the action of Argel leaves, it is quite clear that their admixture with senna is commonly regarded as a serious adulteration, and one, therefore, that should be carefully guarded against. Formerly it was the regular custom, according to Rouillure, to mix two parts of Argel leaves with eight of senna leaflets, and the mixture thus formed constituted commercial Alexandrian Senna. This systematic adulteration was brought prominently into notice by Jacob Bell, at a meeting of the Pharmaceutical Society in 1842, and in consequence of this the quality of Alexandrian Senna in a few years materially improved. Subsequently, however, its quality again deteriorated, and formed the subject of a communication to the Pharmaceutical Society by Professor Bentley. The prominence given in this and other ways to this adulteration has been so beneficial, that at the present day Alexandrian Senna may be commonly met with without containing any Argel leaves. Whenever such admixture occurs, Argel leaves may be readily distinguished from senna leaflets by being equal-sided at their base, less conspicuously veined, paler colour, thicker and more leathery texture, and generally, although not invariably, by their greater length.

Besides the leaves, the flowers and fruits of *Solenostemma Argel* are also occasionally found in bales of Alexandrian Senna. These are readily detected by the characters given in our botanical description.

Per. Mat. Med., vol. ii, pt. 1, p. 660, and vol. ii, pt. 2, p. 353; Per. Mat. Med., by B. & R., p. 857; Christison's Disp., p. 850; Pharmacographia, p. 194; U. S. Disp., by W. & B., p. 799; Bell, in Pharm. Journ., ser. 1, vol. ii, p. 63; Pharm. Journ., ser. 1, vol. viii, p. 400; Bentley, in Pharm. Journ., ser. 2, vol. ii, p. 496.

DESCRIPTION OF PLATE.

Drawn from specimens in the Kew Herbarium, collected in Kordofan by Kotschy (no. 21), and in Egypt by Bromfield. 1. A branch with flowers. 2. A flower. 3. Vertical section of the same. 4. An ovary, style, and stigma. 5. The "gynostegium." 6. An anther seen from within. 7. Two pollinia with the stigmatic corpuscle. 8, 9. Follicles. 10. A seed. (2–7, 10 enlarged.)

M & N Hanhart imp.

D. Prain F.L.S. ad nat. del. et lith

CALOTROPIS PROCERA. *R.Br.*

N. Ord. Asclepiadeæ.

Tribe *Cynancheæ.*

Genus Calotropis,* *R. Br.* B. & H., Gen., ii, p. 754. Species 3, natives of hotter parts of Africa and Asia.

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176. Calotropis procera, *R. Br. in Aiton, Hort. Kew., ed.* 2, ii, *p.* 78 (1811)

Mudar. Madar.

Syn.—C. Hamiltonii, *Wight.* Asclepias procera, *Willd.*

Figures.—Rheede, Hort. Malabar., ii, t. 31; Bot. Register, t. 1792; Wight, Ic. Plant. Ind. Or., iv, t. 1278.

Description.—A shrub, reaching 15 feet in height, with thick twisted branches, the young ones bluntly quadrangular, bark ash-coloured, covered with a minute white woolly down Leaves large, opposite, decussate, spreading, nearly sessile, somewhat amplexicaul, 4—10 inches long, broadly ovate the upper ones narrower, acute at apex, rounded or cordate at base, entire, thick, usually smooth on both surfaces when mature, when young covered especially underneath with fine white down, pale glaucous green, with a tuft or ring of setaceous hairs above at the insertion. Flowers rather large, on pedicels ½—1 inch long, arranged in umbellate corymbs, on erect cylindrical stout peduncles about half the length of the leaves and coming off from between the leaf-bases on alternate sides of the stem; bracts lanceolate, soon falling; peduncles and pedicels covered with fine white wool. Calyx very deeply cut into 5 lanceolate, acute, spreading segments, with a ring of bristly hairs at the base inside. Corolla shallowly cup-shaped, three times the length of the calyx, deeply cut about ¾ down into 5 ovate, acuminate, blunt segments, valvate in the globular buds, thick, quite smooth, pink, shaded and dotted with purple. Stamens 5, inserted near the base of the corolla and alternating with its lobes, filaments combined into a solid fleshy tube surrounding the pistil and united outside with the "corona" which consists

* *Calotropis*, from καλός, beautiful, and τρόπις, a keel; in allusion to the corona.

of five fleshy laterally compressed masses, rounded on the outside at the tops which are somewhat bifid, and produced at the bases into short blunt turned-up spurs or horns, anthers 2-celled, combined, the cells horizontal, opening by a small apical vertical slit, pollinia small, ovate, flat, horizontal. Pistil of two carpels; ovaries small, ovoid, tapering into the distinct filiform styles; stigma single, large, flat, capitate, completely closing in the top of the staminal tube, bluntly 5-angled, the angles alternate with the anthers and each provided with a glandular "corpuscle" to which the two adjacent pollinia adhere. Fruit of two (often one from abortion), short, ovoid, curved, thick, fleshy follicles, somewhat wrinkled and covered with white woolly pubescence. Seed oblong, compressed, with a tuft of hairs at one end, embryo straight in cartilaginous endosperm.

Habitat.—This plant has a wide range in the warm parts of Africa and Asia, being found in Algeria, Nubia, Abyssinia, and the countries further south to Zanzibar, in Palestine, Arabia, Persia, and the northern districts of India, where it is very common on waste ground, about old walls, &c., and flowers nearly all the year round. The plant has become introduced into the West Indies and Central America. It was first grown in English gardens in 1714, and is a somewhat ornamental plant. There is a variety with the flowers white.

In Southern India, Ceylon, Java &c., the place of *C. procera* is taken by the very similar *C. gigantea*, R. Br. (figured in Bot. Register, t. 58, and Wight, Ill. Ind. Bot., ii, t. 155) which differs chiefly by its flat corollas and conical flower buds.

Decaisne, in DC. Prod., viii, p. 535; Roxb., Fl. Ind., ii, p. 30; Boissier, Fl. Orient., iv, p. 57; Flück. & Hanb., Pharmacogr., p. 380.

Official Part and Name.—Calotropidis Cortex; the root bark dried of Calotropis procera, *R. Br.*, and Calotropis gigantea, *R. Br.* (I. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of the United States.

General Characters and Composition.—Mudar bark occurs in small flattish, somewhat twisted or arched pieces; these vary gene-

rally from about $\frac{1}{8}$th to $\frac{1}{5}$th of an inch in thickness, although this and other characters are somewhat modified, according to the plant from which it has been derived. The bark of *C. procera* is that, however, which is commonly sold in the bazaars, and to which our description more especially applies. This consists of an external thickish, spongy, corky portion, which is somewhat fissured longitudinally and of a brownish colour; internally it is mealy and yellowish-grey. It is brittle and breaks short and smooth, and is easily reduced to powder. It has no very marked odour, although this is sometimes described as heavy and peculiar; but it has a mucilaginous, disagreeable, bitter, acrid taste. Portions of the light fibrous wood are often attached to the pieces of the bark.

In the Pharmacopœia of India it is ordered to be collected, dried, and powdered, as follows:—"Take of the roots of Mudar collected in the months of April and May, from sandy soils, a sufficiency; carefully remove, by washing, all particles of sand and dirt, and dry in the open air, without exposure to the sun, until the milky juice contained in them becomes so far inspissated that it ceases to flow on incisions being made. The bark is then to be carefully removed, dried, and reduced to powder. Preserve in well-corked bottles." The outer corky layer of the bark appears to be inert, the milky juice which is principally contained in the middle cortical layer being the active constituent; hence the careful directions given in the Pharmacopœia of India in order to retain it.

The activity of the bark, according to Duncan, resides in a peculiar extractive matter, which he named *mudarine;* but the authors of Pharmacographia by a series of carefully conducted experiments could find no such substance. They describe the principal constituents to be *starch, mucilage,* a *bitter principle,* and a small quantity of *acrid resin.* This bitter principle they regard as the active constituent of Mudar; but they ascertained that no alkaloid occurs in the drug.

Medical Properties and Uses.—Mudar is an alterative, tonic, and diaphoretic, and in large doses emetic. It is said to have been

employed with benefit in numerous obstinate cutaneous diseases, syphilitic affections, dysentery, diarrhœa, and chronic rheumatism. Durant says it is an excellent substitute for ipecacuanha in the treatment of dysentery. The natives of India use nearly all parts of the plant, but the root-bark and the dried milky juice are regarded as the most efficient by regular medical practitioners. The dried juice, however, is stated to be somewhat uncertain and unsafe in its action. Moodeen Sheriff says that the activity of the bark is in proportion to its age; and he recommends that its corky outer portion, which is tasteless and inert, should be removed by scraping before it is powdered for use.

Valuable fibres are also obtained from the stems of *Calotropis gigantea* and other species of *Calotropis*. They are commonly known as Mudar and Yercum fibres. The fibres of the former species can be spun into the finest thread.

Pharmacopœia of India, pp. 141 and 458; Pharmacographia, p. 381; Per. Mat. Med., vol. ii, pt. 1, p. 659; U. S. Disp., by W. & B., p. 1554; Edin. Med. and Surg. Journ., vol. xxxii (1829), p. 60; Drury, Useful Plants of India, 2nd ed., 1873, p. 101; Chem. Gaz., No. 167, p. 76; Durant, in Pharm. Journ., ser. 2, vol. viii, p. 608; Moodeen Sheriff, Supplement to the Pharmacopœia of India, p. 364.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum collected at Zanzibar and in Mexico by Hildebrandt and Pavon.

1. A flowering branch.
2. Androecium and stigma.
3. Pollinia adherent to stigmatic corpuscle.
4. Calyx and pistil.
5. Stigma seen from above.
6. A ripe follicle.

(2–5 enlarged.)

DBlair F.L.S. ad nicc del. et lith TYLOPHORA ASTHMATICA, W. & A. M & N Hanhart imp

N. Ord. Asclepiadeæ.

Tribe *Marsdenieæ*.

Genus Tylophora,* *R. Br.* B. & H., Gen., ii, p. 770. Species about 40, natives of the tropics of the Old World.

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177. Tylophora asthmatica, *Wight & Arn., Contr. Bot. Ind., p.* 51 (1834).

Unta mool, Anta múl (Bengal). *Indian Ipecacuanha.*

Syn.—Cynanchum vomitorium, *Lam.* Asclepias asthmatica, *Willd.*

Figures.—Bot. Mag., t. 1929; Wight, Ic. Flor. Ind. Orient., iv, t. 1277.

Description.—A perennial herb, sometimes slightly woody, with a short slender descending rootstock, giving off numerous, long, fleshy roots. Stems slender, twining, tortuous, terete, densely pubescent, at least when young, reaching 10 or 12 feet in length. Leaves opposite, on pedicels about ½ inch in length, spreading, blade 2—4 inches long, broadly ovate, rounded or cordate at the base, bluntish, but with a short mucro at the apex, quite entire, smooth above, usually downy beneath, thick, the upper narrower. Flowers small, numerous, on slender, bristly pedicels, ½ to ¾ inch long, arranged in irregular, umbellate, long-stalked panicles coming off from between the petioles; bracts rather long, linear. Calyx divided nearly to the base into 5 triangular-linear, striate segments with a few long white bristles on the outside. Corolla twice as long as the calyx, spreading, divided about half-way down into 5 broadly oval segments, dull orange or reddish. Stamens 5, inserted on the base of the corolla, erect, connected at the base, otherwise distinct though in contact, each united on the outer side with the "corona," which consists of 5 distinct, fleshy bodies, broad and flattened below, and prolonged upwards into a narrow, acute, erect tongue about as long as the stamens; anther-cells and pollinia small, horizontal. Pistil of two carpels, ovaries and styles distinct, stigma single, capitate, with a rounded,

* *Tylophora*, from τύλος, a lump or knot, and φορέω, to bear; from the form of the corona-lobes?

prominent centre, and 5 radiating lobes in contact with the anther-cells. Fruit of two ovoid, acuminate smooth follicles, 3 to 4 inches long and widely spreading. Seeds numerous, comose.

Habitat.—This is a common twining plant in light sandy ground throughout peninsular India, especially in the southern parts; it also grows in Ceylon, and a plant found in the Seychelle Islands is referred by Mr. Baker to the same species. It is said to be naturalised in Mauritius.

The variety with glabrous stems and leaves is not uncommon, and is that figured in the plate. *T. lævigata*, Dec., the "Ipéca du pays" of Mauritius and Bourbon, appears scarcely to differ from it.

Decaisne, in DC. Prod., viii, p. 611; Roxb., Fl. Indica, ii, p. 33; Baker, Fl. Mauritius, p. 229; M. C. Cooke, in Pharm. Journ., 1870, p. 105.

Official Part and Name.—TYLOPHORÆ FOLIA; the dried leaves (I. P.). They are not official in the British Pharmacopœia, or the Pharmacopœia of the United States.

General Characters and Composition.—In the Pharmacopœia of India, the characters of the dried leaves are given as follows:—From two to three inches in length, entire, ovate-roundish, acuminated, cordate at the base, glabrous above, downy beneath. They have a heavy disagreeable smell when bruised, and a nauseous taste.

No complete analysis of these leaves has been made, but the authors of Pharmacographia state that a concentrated infusion is "abundantly precipitated by tannic acid, by neutral acetate of lead or caustic potash, and is turned greenish-black by perchloride of iron." Broughton obtained some crystals from the leaves, but in too small a quantity for analysis; but when "dissolved and injected into a small dog, they occasioned purging and vomiting."

Radix Tylophoræ.—Besides the leaves, which are alone official in the Pharmacopœia of India, the root is also sold in the Indian bazaars in the form of twisted pieces of a pale colour, and having a bitterish, somewhat nauseous taste. It is described in Pharmacographia as consisting "of a short knotty descending rootstock, about $\frac{1}{8}$ of an inch in thickness, emitting 2 to 3 aerial

stems, and a considerable number of wiry roots. These roots are often 6 or more inches in length by ½ a line in diameter, and are very brittle. The whole drug is of a pale yellowish brown; it has no considerable odour, but a sweetish and subsequently acrid taste. In general appearance it is suggestive of valerian, but is somewhat stouter and larger."

Medical Properties and Uses.—Both the root and leaves have been long employed medicinally in India, and form an excellent substitute for Ipecacuanha; the root has been longest in use, but the leaves are now considered as more uniform and certain in their operation, and are alone official. They have emetic, diaphoretic, and expectorant properties. They have been chiefly employed in the treatment of dysentery; but are also useful in catarrh, asthma, and other affections in which ipecacuanha is given. Dr. J. Kirkpatrick thus refers to their properties :—"I have administered this medicine in at least a thousand cases, and found it most valuable. In dysentery, and as a simple emetic, it is in every way comparable with ipecacuanha. The dose is from twenty to thirty grains, with half a grain or a grain of tartar emetic, if a strong emesis is required. If the dysentery distinctly arise from intermittent disease, quinine is conjoined. The form of the medicine I use is the powder of the dry leaf. If the root were used, the supply would soon be exhausted; besides, I have found it less certain than the leaf. In catarrhal and chronic coughs it seems to act well." The value of this remedy has been testified to by so many practitioners in India, that it is worthy of an extended trial in this country. It is also much used in Mauritius, where it is known as *Ipéca du pays*, or *Ipéca sauvage*.

O'Shaughnessy, Bengal Dispensatory (1842), p. 455; Roxburgh, Flor. Ind., vol. ii, p. 34; Pharmacopœia of India, pp. 142 and 458; Pharmacographia, p. 382; Cooke, in Pharm. Journ., vol. i, ser. 3, p. 105.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected by Wight in India (no. 1543). 1. Portion of stem with flowers. 2. A flower. 3. The "gynostegium." 4. Calyx and pistil. (2–4 enlarged.)

D.Blair ad sicc. del. et lith.

M&N Hanhart imp.

STRYCHNOS NUX-VOMICA *Linn.*

N. Ord. Loganiaceæ. Lindl., Veg. K., p. 602; Le Maout & Dec., p. 555.

Tribe *Loganieæ.*

Genus Strychnos,* *Linn.* B. & H., Gen., ii, p. 797. Species about 60, widely spread through the tropics of both old and new worlds.

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178. Strychnos Nux-vomica,† *Linn., Sp. Plant., ed.* 1, *p.* 189 (1753).

Nux-vomica. Poison-nut. Kuchila (Bengal).

Syn.—S. colubrina, *Wight.* S. ligustrina, *Blume?*

Figures.—Woodville, t. 79; Roxburgh, Pl. Coromandel, i, t. 4, cop. in Hayne, i, t. 17; Steph. & Ch., t. 52; Nees, t. 209; Berg & Sch., t. 136; Wight, Ic., t. 434; Beddome, Fl. Sylvat., t. 242.

Description.—A moderate-sized tree, with a short thick trunk and irregular branches covered with a yellowish-grey nearly smooth bark, branchlets much thickened at the nodes by the persistent leaf-bases, dichotomous. Leaves opposite, without stipules, shortly stalked, 2—4 inches long, oval-rotundate, rounded or somewhat tapering at the base, acute at the apex, entire, smooth and shining on both sides, 3- or 5-nerved from the base, but only the midrib reaching the apex. Flowers laxly arranged in small trichotomous paniculate cymes at the ends of the branches; the central flowers sessile, the lateral shortly stalked, pedicels downy. Calyx small, with 5 shallow, acute, teeth, downy outside, persistent, thick. Corolla over $\frac{1}{4}$ inch long, funnel-shaped, with 5 short, valvate-induplicate, oblong-lanceolate, blunt segments, rather fleshy, smooth outside, densely hairy for the lower $\frac{2}{3}$ of the tube within, greenish-white. Stamens 5, inserted in the throat of the corolla and alternate with its lobes, filaments excessively short, anthers oblong, dorsifixed, 2-celled. Ovary small, 2-celled, with numerous

* *Strychnos* from the Greek στρύχνον, equivalent to the Latin *Solanum*, was used for several poisonous plants, but not for the present one.

† *Nux vomica* was the name of the drug in the shops as early as the 16th century.

ovules in each cell in several rows on the axile placentas. Style filiform, a little longer than the corolla, stigma capitate, faintly bifid. Fruit a smooth, shining, globular berry, as large as an apple, varying from $1\frac{1}{4}$ to over 2 inches in diameter, rind tough or somewhat hard, thin, bright orange-yellow, when ripe completely filled by a soft white gelatinous pulp in which the seeds are irregularly immersed, and which is traversed by the fibrous remains of the dissepiment. Seeds several, usually 1—5, circular, nearly flat, about 1 inch in diameter and nearly $\frac{1}{4}$ inch thick, slightly hollowed in the central part of the dorsal surface, somewhat convex on the ventral, margin rounded and narrowly keeled; testa blackish-, yellowish-, or whitish-grey, very densely covered with fine short, adpressed, whitish silky hairs, radiating from the centre, hilum, central prominent, raphe slightly raised, passing to a slight prominence in the margin; embryo $\frac{3}{8}$ inch long, lying at the edge of the seed in a broad chink of the horny endosperm which readily splits into two halves, radicle thick, club-shaped, cotyledons cordate-ovate, acute.

Habitat.—This tree is common in many parts of Southern India, as the Malabar and Coromandel coasts; it also grows in Ceylon and in Burmah, Cochin-China, Timor, and Java, and even extends to N. Australia, if *S. lucida*, R. Br., be properly referred to the same species. It flowers in the cold season.

Plants are still cultivated in our botanic gardens, the tree having been first brought here in 1778 by Dr. P. Russell.

DC. Prod., ix, p. 15; Roxb., Fl. Ind., i, p. 575; Benth., Fl. Austral., iv, p. 369; Lindl., Fl. Med., p. 528.

Official Parts and Names.—1. Nux Vomica; the seeds: 2. Strychnia; an alkaloid prepared from Nux Vomica (B. P.). The seed (*Nux Vomica*) (I. P.). Nux Vomica; the seed (U. S. P.).

1. Nux Vomica.—*Commerce.*—Nux vomica is imported into Great Britain and other parts of the world, from the East Indies. There are no recent returns of the quantity imported into this country, but judging from those of a few years since, the amount

cannot annually be less than 6000 cwt. This is about half of the whole quantity exported from British India. The imports of Nux Vomica into this country have enormously increased of late years, as may be judged of by the fact that, in the years 1838, 1839, and 1840, duty was only paid on an annual average of 680 lbs.

General Characters and Composition.—The seeds, which are commonly known under the official name of *Nux Vomica,* as seen in commerce, are nearly round in form, and on an average, about seven-eighths of an inch in diameter, by nearly a quarter of an inch in thickness; they are nearly flat on both surfaces, or more commonly, slightly convex on one surface, and concave on the other, and marked in the centre of the latter surface by a roundish scar or hilum, from which a more or less projecting line or raphe is seen to pass to the circumference, where it terminates in a slight prominence. In some cases the seeds are more or less curved or irregularly twisted so as to modify in some degree the above characters. The testa or seed-coat is of an ash-grey or yellowish-grey-green colour, and has a glistening appearance from being thickly covered with short satiny hairs. The seeds are very hard and horny, without any perceptible odour, but having an extremely bitter taste. They are powdered with difficulty, and the powder has a yellowish-grey colour. By the Germans they have been named *Krähenaugen* or *Crows' eyes,* from their being poisonous to crows, and their fancied resemblance to grey eyes.

Nux Vomica contains three crystalline alkaloids, namely, *strychnia, brucia,* and *igasuria,* all of which have a bitter taste and poisonous properties; but by far the most important in a medicinal point of view, is the alkaloid strychnia, which, being official, is described below. All these alkaloids are said to be combined with a peculiar acid, termed *strychnia* or *igasuric acid,* and which, according to Ludwig, is a yellowish-brown amorphous mass, with a sour astringent taste, and a strongly acid reaction. *Igasuria* is said by Schützenberger, to be composed of nine distinct bases, differing from each other in their solubility in water, in composition, and in other characters; it requires further examina-

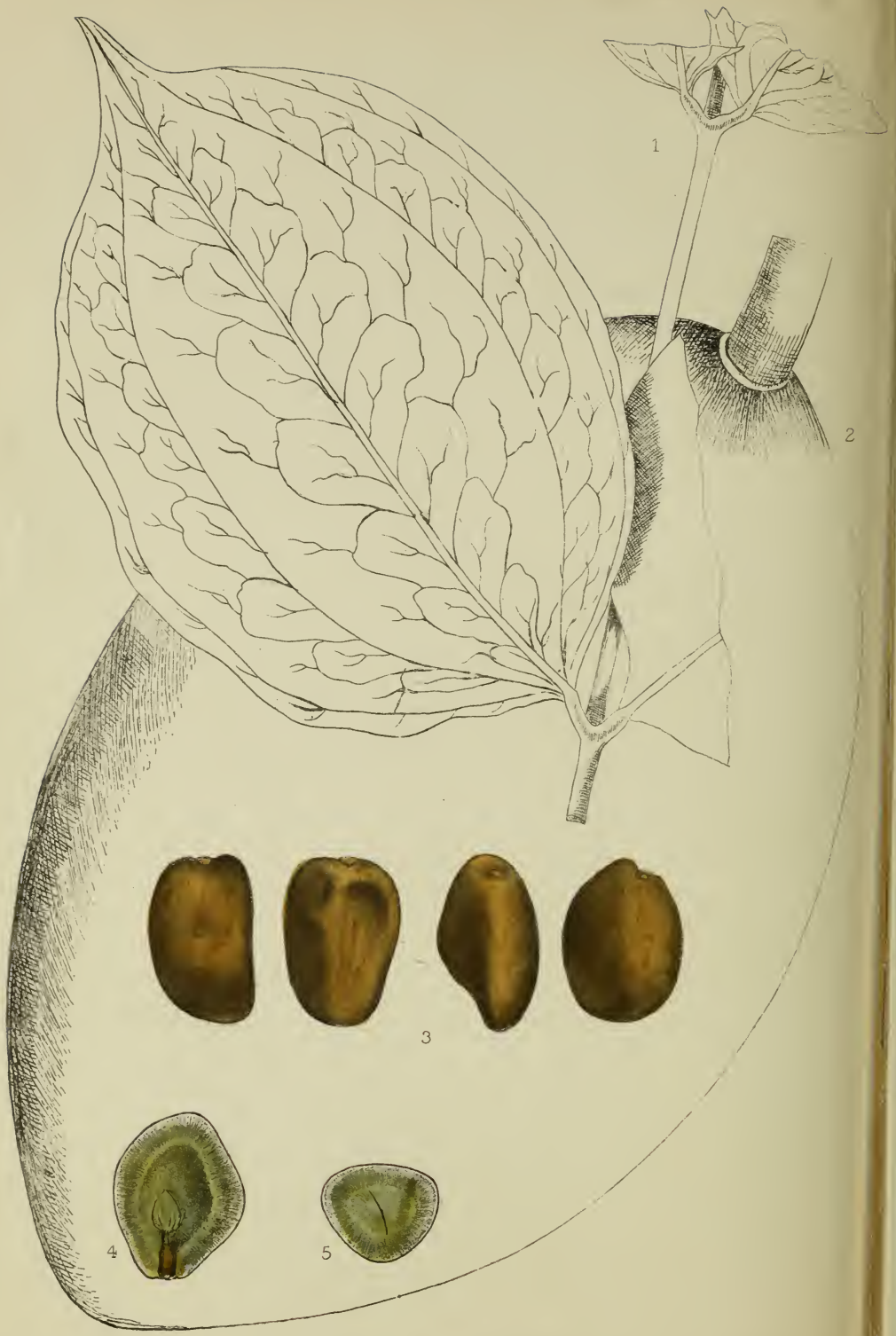
tion. *Brucia* is obtainable from nux vomica in proportions, which have been variously estimated at from 0·12 to 1·01 per cent. It very much resembles strychnia in its bitter taste and poisonous properties, &c., and like it forms crystalline salts; but neither it nor its salts are so powerful as strychnia and its compounds. According to Andral, brucia is only about one twelfth of the strength of strychnia. It differs from strychnia in its far greater solubility in water, being dissolved in about 150 parts of boiling water; and by acquiring, as well as its salts, an arterial blood-red colour when moistened with concentrated nitric acid. The other constituents of nux-vomica are of little importance.

2. Strychnia or Strychnine.—This is contained in nux vomica in proportions varying from $\frac{1}{4}$ to $\frac{1}{2}$ per cent. We have been informed on reliable authority, that the Bombay nux vomica of commerce, contains a much larger proportion of strychnia than Madras nux vomica; it is important, therefore, that in so powerful a medicine as nux vomica, a full chemical examination should be made of the seeds of different districts, and the results published. Strychnia occurs in right square octahedrons or prisms, colourless and inodorous, soluble in about 6700 parts of cold, or 2500 parts of boiling water. It is so intensely bitter that when one part of the alkaloid is dissolved in 600,000 parts of water, this taste is perceptible. It is soluble in chloroform, and in boiling rectified spirit; but very sparingly so in absolute alcohol, benzol, or ether. It is not coloured by nitric acid; and when burned with free access of air it leaves no ash. Pure sulphuric acid forms with it a colourless solution, which on the addition of bichromate of potash acquires an intensely violet hue, speedily passing through red to yellow. It is a very active poison; and when a few drops of a solution containing only $\frac{1}{5000}$ of a grain is placed in contact with the skin of a frog, it causes tetanic spasms in less than half an hour.

Medical Properties and Uses.—The action of nux vomica is essentially due to its alkaloid strychnia, which so increases the reflex excitability of the spinal cord that the slightest stimulus, such as a sudden noise, a touch, or even a breath of air, causes

tetanic spasms. Strychnia has no direct influence on the heart, the voluntary muscles, the cerebral centres, or motor nerves. Thus, when given to man in sufficient doses, it causes twitching and rigidity of the muscles, succeeded by tetanic spasms, but without loss of consciousness; and in the intervals between the paroxysms the muscles become relaxed The fatal effects of excessive doses of strychnia have been counteracted by chloroform, chloral hydrate, calabar bean, conium, and monobromated camphor. The experiments of Crum Brown, Frazer, and Schroff show that the methyl and ethyl compounds of strychnia have an action directly the reverse of that of strychnia itself, for instead of producing tetanic spasms like it, they induce a condition of general paralysis of the body by paralysing the extremities of the motor nerves, like curare or conium. Nux vomica and strychnia possess valuable nervine tonic and stimulant properties. They have been found of especial value in the treatment of paralysis, but more especially in that form which results from lead poisoning; also in neuralgia, chorea, aphonia, impotence, constipation arising from torpor of the colon, incontinence of urine, spermatorrhœa, debilitated states of the system succeeding exhaustive illnesses, such as rheumatic fever, in atonic diarrhœa and chronic dysentery, and in prolapsus of the rectum, pyrosis, amaurosis, epilepsy, and other affections. There is no doubt that the preparations of nux vomica are especially valuable in the atonic complaints so common in India and other hot countries. On account of their powerful properties all the preparations of nux vomica should be used cautiously, and their effects carefully watched.

In consequence of the large importations of late years of nux vomica, it was thought by many persons, that the seeds were employed in the manufacture of bitter ale on account of their intense bitterness, but although this has been disproved, it is still unknown for what purposes they are so largely required, their consumption in medicine being comparatively limited. A large quantity of both nux vomica and strychnia are, however, employed by gamekeepers, &c., to destroy vermin, &c. Both nux vomica and strychnia are also used to some extent in veterinary practice.



D.Blair F.L.S. del. et lith

STRYCHNOS IGNATII, *Berg*

M & N Hanhart imp

N. Ord. LOGANIACEÆ.
Tribe *Loganieæ*.
Genus Strychnos, *Linn.*

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179. Strychnos Ignatii,* *Bergius, Mat. Medica, i, p.* 146 (1778).

Aguason, Canlara, Mananaog, Catalonga, Igasud (Bisaya). *Yasug* (Cochin China). *Coyacoy* (Bohol). *St. Ignatius' Beans.*

Syn.—Ignatiana philippinica, *Lour.* S. philippensis, *Blanco.*

Figures.—Philosoph. Transactions, xxi, t. 1, figs. 4—6 (leaves, fruit, and seed); Gaertner, De Fruct., ii, t. 179 (seed only); Berg, Characterist., t. xxx, fig. 240 (section of fruit and seed).

Description.—A large shrub or small tree with an erect stem and numerous very long, opposite, smooth, climbing branches, quadrangular at the extremities. Leaves opposite, shortly stalked with rounded petioles, about 5 inches long, broadly oval, acute at both ends, quite entire, nerved with three prominent veins from base to apex, whence spring smaller reticulations, flat, smooth. Flowers numerous on axillary sub-quadriflorous peduncles arranged in panicles. Calyx very short, 5-toothed. Corolla funnel-shaped with a long tube 6 or 7 times the length of the calyx and 5 spreading obtuse segments, white. Stamens 5, anthers either sessile in the throat of the corolla or on filaments as long as the tube. Style as long as the stamens; stigma bipartite, truncate, thick. Fruit large, 4—7 inches long, sub-globose or ovoid, quite smooth, whitish, pericarp thick, dry, woody, indehiscent, brittle, one-celled, containing numerous seeds closely pressed together. Seed very irregular in form, oblong-ovoid, but variously flattened and compressed by mutual pressure in different directions, not angular but all the edges rounded, about an inch long by $\frac{1}{2}$—$\frac{3}{4}$ inch wide, the outside ones with a large curved convex surface; testa very thin, dull greyish-brown covered with a thick coat of short yellow hairs (which are easily detached) radiating from the

* *Ignatii.* For the story which connects these seeds with the founder of the Society of Jesus, Ignatius Loyola, see Phil. Trans. for 1699, p. 87.

faintly marked central hilum, raphe not raised or obvious; embryo ½ inch long, contained in a broad chink which nearly divides the very hard greyish-brown endosperm into two halves, which, however, do not separate; radicle close to the edge of the seed and forming a projection beneath the testa, very much thickened at the end, attenuated and flexuose above, cotyledons lanceolate-ovate, stalked, very thin, flat.

Habitat.—The above description, except that of the seeds, is derived from the works of Blanco and Loureiro. We have been unable to find a specimen of the plant in herbaria, and every effort to obtain one from Manila has been unsuccessful. We are thus compelled to reproduce the only figures that exist, the rough outlines given in the 'Philosophical Transactions' for 1699 to accompany Camelli's original account of the drug. These figures were no doubt copied from sketches sent by Camelli, but we cannot discover the originals amongst his drawings in the British Museum. The fruit is represented as more ovoid than appears to be usually the case, the older writers comparing it to a gourd; unfortunately too the fruit seen by Hanbury in the possession of Mr. Morson, and shortly described in 'Pharmacographia,' cannot now (1879) be found.

The plant grows in Bohol and other of the Bisayan islands of the Philippines, where it is said to be common especially in Catbalogan. It has a scandent habit and ascends by its long climbing branches over high trees. It has also been found in Cochin China, where it is said to have been introduced, and perhaps also at or near Singapore. Hanbury states that it is met with in the drug shops of China under the name *Leu-sung-kwo* (Luzon fruit).*

The genus *Ignatia* of Linnæus must be entirely suppressed, it having been shown by Bentham that its description was made up,

* Mr. Porter Smith in his 'Contributions to Materia Medica of China' (p. 116) considers that there is some confusion in this statement. According to him (and this is confirmed by his specimens in the Pharmaceutical Society's collection) *Lu-sung-kwo* are the seeds of a *Pinus* (apparently those of the Stone Pine, *P. Pinea*), whilst the Ignatius' beans are called *Ku-shih-patau* (Bitter Croton fruit).

through some error, of the fruit of a Philippine *Strychnos* and the flowers of a Rubiaceous plant of Guiana *Posoquieria longiflora*.

M. Pierre, Director of the Botanic Garden at Saigon, has suggested that Ignatius' Beans are the same as the Lukrabo seeds of Siam.* These are the produce of an unpublished species of *Hydnocarpus*. But the two seeds are completely distinct, and there seems little reason to doubt that the former are rightly referred to the genus *Strychnos*. Sir Joseph Hooker, however, whilst doubting the identity of the two seeds, is yet inclined to think that Ignatius' Beans may be probably the produce of some member of the *Pangieæ* (compare No. 28, *Gynocardia odorata*).

Camelli & Petiver, in Philos. Trans., xxi, p. 88 (1699); Plukenet, Mantissa Plant., p. 60 (1700); Raii, Hist. Plant., iii, lib. 31, p. 118; Loureiro, Fl. Cochin Chin., p. 125 (1790); Blanco, Fl. Filip., ed. 2, p. 61 (1845); DC. Prod., ix, p. 18 (*Ignatia amara*, L.); Lindl., Fl. Med., p. 530; Flück. & Hanb., Pharmacogr., p. 387; Report of Kew Garden for 1877, p. 33.

Official Part and Names.—Ignatia; the seed of Strychnos Ignatia, *Lindl.* (U. S. P.). These seeds are commonly known as St. Ignatius' Beans. They are not official in the British Pharmacopœia, or the Pharmacopœia of India. In the Indian bazaars the seed is known under the name of *papeeta*, a corruption of the Spanish term *pepita*. The ordinary name of St. Ignatius' Beans applied to these seeds is also used in South America to designate the seeds of several medicinal Cucurbitaceous plants.

General Characters and Composition.—As seen in commerce these seeds are about an inch in length, and somewhat less in breadth and thickness; they are more or less ovoid in form, but in consequence of mutual pressure whilst in a soft state this form becomes very irregular, and they present, when mature and dry, three, four, or five faces, and a corresponding number of blunt angles; they are marked at one end by a small hilum. Externally they are more or less covered with short adpressed hairs; and present a dull grey or brownish colour. They are broken with

* These seeds are figured in Hanbury's Notes on Chinese Materia Medica, fig. 9 (Science Papers, p. 244). They are imported into China from Siam, and called *Ta-fung-tsze*.

difficulty in consequence of their very hard horny albumen, which is of a brownish colour and translucent. When digested for a time in warm water, the seeds swell to a great extent, and have then a heavy earthy smell. They have an excessively bitter taste, and are very poisonous.

Their constituents are essentially the same as those of nux vomica, yielding both *strychnia* and *brucia,* combined with *igasuric acid.* The proportion of strychnia is stated to be 1·5 per cent., and that of brucia 0·5 per cent. These seeds are commonly said to contain three times as much strychnia as nux vomica seeds; but, as we have mentioned in our notice of *Strychnos Nux vomica,* the proportion of strychnia varies a good deal in the nux vomica of different districts.

Medical Properties and Uses.—Their properties are identically the same as those of nux vomica; and are therefore applicable to the same purposes in medicine. On account of their powerful effects they must be used, however, with very great caution. An eligible form of administration is the alcoholic Extract of Ignatia of the United States Pharmacopœia; the dose of which is from half a grain to a grain and a half, in pill, three times a day, to be repeated until its effects begin to be experienced. The effects and uses of nux vomica are given in our article on "Strychnos Nux vomica." St. Ignatius' beans are largely used in India in native practice. By old writers they were regarded as a remedy against cholera.

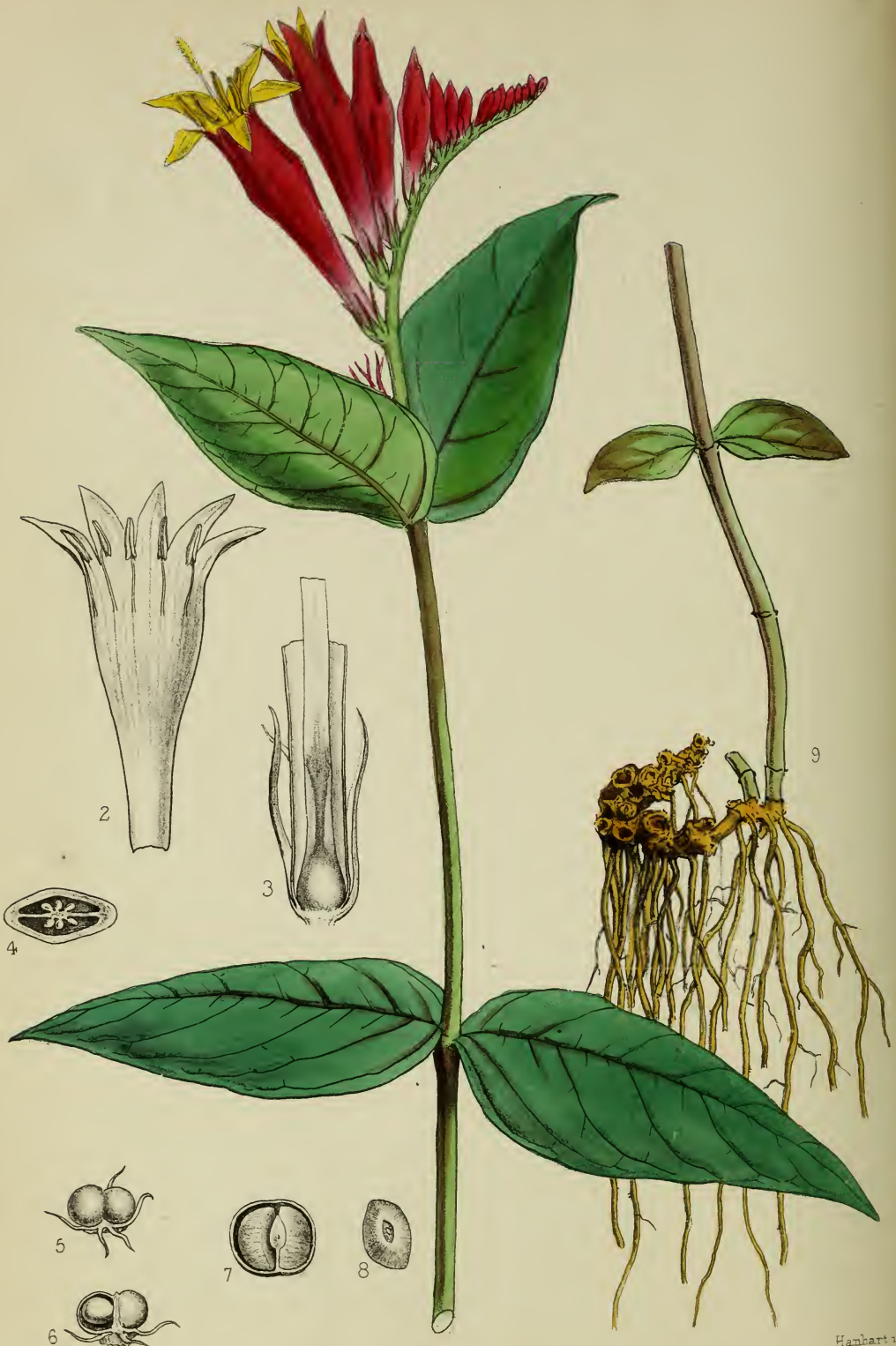
These seeds, when they can be readily obtained, are much esteemed for the manufacture of strychnia; but their supply is very irregular.

Pharmacographia, p. 387; U. S. Disp., by W. & B., p. 478; Pharmacopœia of India, p. 146; Caldwell, in Amer. Journ. Pharm., July, 1857, p. 298; Macadam, in Pharm. Journ., vol. xvi, ser. 1, pp. 120 & 160.

DESCRIPTION OF PLATE.

The seeds drawn from a commercial sample; the leaves and fruit reproduced from Camelli's plate.

1. Portion of branch with leaves. 2. A fruit. 3. Seeds. 4. Vertical; and 5. Transverse section of the same.



DBlair FLS. ad sicc del. et lith.

SPIGELIA MARILANDICA, *Linn.*

Hanhart imp

N. Ord. Loganiaceæ.

Tribe *Loganieæ*.

Genus Spigelia,* *Linn.* B. & H., Gen., ii, p. 790. There are 30 species, natives of North and Tropical America.

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180. Spigelia marilandica, *Linn., Syst. Nat., ed.* 12, ii, *p.* 734 (1767).

Indian Pink-root. Maryland Pink-root. Worm Grass.

Figures.—Barton, t. 31; Bigelow, t. 14; Woodville, t. 69; Steph. & Ch., t. 7; Nees, Suppl.; Catesby, Nat. Hist. Carolina, ii, t. 78; Bot. Mag., t. 80; Berg, Characterist., t. 32, fig. 251.

Description.—A perennial herb with a small, twisted, knotty, horizontal root-stock, giving off numerous long, slender, matted, yellow roots. Stems several, ½—2 feet high, erect, simple, bluntly quadrangular or nearly cylindrical, purplish, smooth. Leaves few, opposite, sessile, without stipules but connected by a transverse line, ovate-lanceolate, acute, spreading, 2—3 inches long, the lowest pair much smaller and roundish, quite entire, smooth on both surfaces, paler beneath and there slightly pubescent on the veins. Flowers few, 4—12, rather large, sessile or very shortly stalked, erect, placed singly at short intervals on one side of the stem above the upper pairs of leaves and forming a short unilateral, sometimes forked, terminal spike which is more or less curved in a slightly scorpioid manner, no bracts. Calyx small, persistent, very deeply divided into 5 linear-subulate, erect segments, smooth. Corolla 1½ inch long, tubular-funnel-shaped, cut about ⅕ down into 5 rather narrow, acute, erect or spreading lobes, valvate in the bud, bright crimson outside, orange yellow within, the lobes narrowly bordered with pale green, smooth. Stamens 5, inserted above the middle of the corolla-tube; filaments short, slightly exserted; anthers erect, linear-oblong, 2-celled, yellow, Ovary superior, compressed, smooth, 2-celled, with several ovules in each cell; style long, flattened in

* *Spigelia* commemorates Adrien van den Spieghel, a Flemish botanist. He became Professor at Padua, and died in 1625.

the lower part, and jointed below the middle, exceeding the stamens, hairy in the upper portion. Fruit small, laterally compressed, 2-celled, dry, smooth, yellow, greenish-brown, of two roundish lobes, distinct when mature; pericarp thin, dehiscing loculicidally. Seeds few, somewhat angular from pressure, rather rough, yellow; embryo short, straight, in fleshy endosperm.

Habitat.—This handsome plant grows on the borders of rich woods in the Southern United States, extending as far north as New Jersey and Wisconsin, but rarely found north of Virginia. It flowers in June and July, and was introduced into English horticulture in 1694. It is not, however, commonly cultivated here, being only occasionally to be met even in botanic gardens.

A. Gray, Man. Fl. N. U. S., p. 392; Chapman, Fl. South. States, p. 181; DC. Prod., ix, p. 5; Lindl., p. 524.

Official Part and Names.—SPIGELIA; the root (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India, but it was formerly recognised in the London, Edinburgh, and Dublin Pharmacopœias. It is also termed Pink Root in the Pharmacopœia of the United States. In price lists it is frequently incorrectly called *Radix caryophylli.*

Collection. — It was formerly collected by the Creek and Cherokee Indians in Georgia and the neighbouring States; they disposed of it to the white traders, and by these it was packed in casks, or more commonly in large bales weighing from three hundred to three hundred and fifty pounds. The whole plant was then gathered and dried. At present, however, according to the United States Dispensatory, the supply, which is plentiful, and consists chiefly of roots, is obtained from the Western and South-Western States of America. It is said to come in casks or bales from St. Louis by way of New Orleans; that contained in casks, being less commonly damp and mouldy, is preferred.

General Characters and Composition.—The root is alone official, but the quadrangular stems, a foot or more long, and bearing opposite, sessile, acuminate, entire leaves, are sometimes attached to it. The whole herb has a feebly bitter, somewhat acrid taste; but only a very faint odour.

The so-called root, which is known under the names of *Spigelia, Indian Pink Root,* and *Carolina Pink Root,* consists of numerous dark brown, slender, branched, wiry, twisted, wrinkled, and furrowed rootlets, from three to six inches long, attached to a short, dark-brown rhizome, which exhibits traces of the aërial stems of former years. The activity of Spigelia is said to diminish by keeping; and the official roots are regarded as more active than the stem and leaves. Spigelia may be distinguished from Serpentary root, which it closely resembles, by its shorter and more furrowed rootlets; and by the absence of any marked odour.

According to Wackenroder, spigelia contains a *fixed oil, acrid resin,* a *bitter acrid extractive, tannic acid,* and other unimportant constituents. The bitter extractive, upon the presence of which its virtues are supposed to depend, when taken internally, produces vertigo and a kind of exhaustion. Dr. Stabler, of the United States, also analysed it, and found a *bitter uncrystallizable principle, tannic acid, some salts,* and other unimportant substances. The leaves are said to yield less of the bitter principle than the root, and are regarded as of inferior efficacy; hence the latter is alone official.

Adulterations.—It is stated in the United States Dispensatory that "the roots are sometimes mixed with those of other plants, particularly of a small vine which twines round the stems of the Spigelia. These are long, slender, crooked, yellowish, thickly set with short capillary fibres, and much smaller and higher coloured than the pink root. They should be separated before the latter is used." Spigelia is also said to be adulterated with what has been termed East Tennessee pink root, the botanical origin of which is unknown.

Medical Properties and Uses.—In large doses it usually acts as an irritant cathartic, and in overdoses as an acro-narcotic poison. It is rarely, however, that any ill effects arise from its employment, provided it purges, and hence it is commonly prescribed with calomel, senna, or some other cathartic. Its most marked effect is as an anthelmintic, for which purpose it is highly esteemed in the United States, though scarcely ever used in this country by

the regular practitioner, and only occasionally in domestic practice. The dose of the powder, for a child of three or four years old, is from ten to twenty grains; and for an adult, from sixty to one hundred and twenty grains. Or, from four fluid drachms to a fluid ounce may be given of the infusion of the United States Pharmacopœia, to a child; and from four to eight fluid ounces to an adult. The dose should be repeated every morning and evening for several days, and then followed by a brisk cathartic. It is said to be particularly efficacious against *Lumbrici* or *Round Worms*. In the United States a preparation is much prescribed by physicians under the name of *worm tea;* it is a mixture of spigelia, senna, manna, and savine, "mixed together in various proportions, to suit the views of different individuals."

The root and herb generally of *Spigelia anthelmia,* or *Demerara Pink root,* is also a popular remedy in British Guiana, as an anthelmintic. Its effect is said to be even more certain and marked than that of the official pink root.

Per. Mat. Med., vol. ii, pt. 1, p. 632; Pharmacographia, p. 389; U. S. Disp., by W. & B., p. 832; Stillé, Therapeutics and Mat. Med., vol. ii, p. 622; Proc. Amer. Pharm. Assoc. (1857), p. 132; Journ. de Pharm., vol. ix, p. 897; Pharm. Journ., vol. v, ser. 1, p. 354.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected by Chapman in Florida; the fruit added from Nees.

1 Upper part of a flowering stem.
2. Corolla laid open.
3. Ovary and lower part of style; half of calyx and corolla-tube removed.
4. Transverse section of ovary.
5. Fruit with persistent calyx.
6. The same, with one cell opened.
7. Vertical section of the same.
8. A seed.
9. Base of stem and rootstock.

(3, 4, 7, 8 enlarged.)

D. Blair ad nat. del. et lith.

M & N Hanhart imp.

GELSEMIUM NITIDUM, *Mich.*

N. Ord. Loganiaceæ.

Tribe *Gelsemieæ*.

Genus Gelsemium,* *Juss.* B. & H., Gen., ii, p. 789. There are 3 species, one North American, one from China, and one from Sumatra.

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181. Gelsemium nitidum, *Michaux, Fl. Bor.-Amer.*, i, *p.* 120 (1803).

Wild Yellow Jessamine (South United States). *False Jasmine.*

Syn.—Bignonia sempervirens, *Linn.* G. sempervirens, *Aiton* (1811). G. lucidum, *Poir.*

Figures.—Plukenet, Phytographia Botan. (1691), t. 112, fig. 5; Catesby, Nat. Hist. Carolina, i, t. 53; Herb. de l'Amateur, t. 169.

Description.—A woody twining plant, with a woody much-branched root (? rhizome) and slender, smooth, cylindrical, purplish stems climbing to a great height. Leaves opposite, persistent, very shortly stalked, with very minute stipules, blade about 2 inches long, ovate-lanceolate or lanceolate, acute at both ends, entire, smooth and shining, bright green, paler beneath. Flowers large, very shortly stalked, solitary or 2 or 3 together on a short slender axillary peduncle, which is scaly with numerous small, stiff, fleshy, imbricated, acute or blunt bracts. Calyx small, very deeply divided into 5 very nearly distinct, erect, strongly imbricated, ovate, acute or obtuse, smooth segments with membranous margins. Corolla large, 1—1½ inch long, funnel-shaped, with a wide mouth, shallowly cut into 5 nearly equal, rounded, acute, ascending, imbricated lobes, smooth within and without, bright yellow. Stamens 5, inserted on the base of the corolla-tube, filaments equal, included, anthers oblong-linear, adnate, extrorse, rounded-sagittate at base. Ovary smooth, seated on a short broad gynophore, compressed, tapering upwards into the long style, 2-celled, with several ascending ovules in each cell, style

* *Gelsemium*, altered from *Gelseminum*, a form of *Jasminum*; all mediæval names for the Jasmines (or Jessamines), with which this was classed.

cleft into two above, each branch again divided into two linear, flat, spreading stigmas. Fruit a dry, oblong-ovoid, compressed, beaked, smooth, pendulous, pale brown capsule, nearly ¾ inch long, 2-celled, with the dissepiment across the narrow diameter; pericarp chartaceous thin, veiny, dehiscing septicidally into 2 boat-shaped valves which again are partially split down the back from the top. Seeds several, rather large, flat, imbricated, pale cinnamon-brown, finely muricated, surrounded by a thin papery border which is prolonged at one end into a large, oblong, slightly crumpled wing; embryo straight with a thick superior radicle in the axis of copious fleshy endosperm.

Habitat.—This beautiful climbing shrub with nearly evergreen leaves and very sweetly-scented flowers is a native of the Southern United States from Virginia southwards, extending also into Mexico.

It flowers in March and April, and the flowers present the dimorphic conditions of long- and short-styled. The scent is compared to that of wall-flowers, but a scentless variety is also met with. The plant always climbs over the top of the support, and will cover with its thick foliage the summit of a tree 50 feet high.

The "sweete yellow climing Virginian Jasmine" was first found by Tradescant, and was grown in England from seed brought home by him in the garden of John Parkinson before 1640. There is a plant in the Kew collection now, but it does not flower.

Gelsemium has been variously referred to *Loganiaceæ*, *Rubiaceæ*, *Apocyneæ*, *Bignoniaceæ*, and *Gentianaceæ* by authors; but the best authorities are now agreed in placing it in the first-named family.

Parkinson, Theatr. Bot., p. 1465; Michaux, Fl. Bor.-Amer., i, p. 120; A. Gray, Man. Bot. U. St., p. 391; Chapman, Fl. South. St., p. 183; DC. Prod., ix, p. 24.

Official Part and Name.—GELSEMIUM; the root of Gelsemium sempervirens, *Gray* (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters.—The so-called *Gelsemium* or *Yellow Jasmine root* of the United States' Pharmacopœia, as usually seen in commerce, is a mixture in varying proportions of pieces of the subterranean stems and of the true roots and rootlets; and in some specimens we may also find a few pieces of the slender aërial stems. As a general rule, however, the largest proportion of all samples is composed of pieces of the subterranean stem. Gelsemium is also found in two states, that is—either in packets consisting of small pieces of the root or subterranean stem, compressed into a compact mass, which is the form in which it is prepared by the Shakers of New Lebanon; or in separate pieces varying commonly from half an inch to six inches or more in length, and from about a quarter to three quarters of an inch in thickness. We also sometimes find a large proportion of small rootlets mixed with the larger pieces. There is probably no essential difference between the true roots and subterranean stems in their medicinal value.

The pieces of *root* are usually entire, although rarely in longitudinally split portions; when entire, they are nearly cylindrical in form, and if of any size but little branched. Their external surface is nearly smooth, of a pale brown colour, with somewhat darker coloured irregular superficial longitudinal furrows, and occasionally some transverse cracks may be noticed. A transverse section shows that the root is composed of a thin dark-coloured bark, and a large hard woody portion or meditullium, which has no pith. The meditullium has a yellowish-white colour when dry, but becomes brighter yellow after it is moistened with water; it is traversed by large whitish medullary rays, which radiate from the centre, and between which the wedges of wood are seen to present a very porous structure; these wedges project beyond the surface of the meditullium, so as to produce irregular, slightly elevated, longitudinal ridges, which alternate with corresponding depressions. The taste, especially of the cortical portion, is bitter and not unpleasant, and the odour is generally thought to be feebly narcotic, but it has been described by Holmes, more especially when in the form of tincture, as somewhat between senega and green tea.

The subterranean pieces of *stem* are distinguished from those of the root by having a rougher external surface; by being marked in a longitudinal direction by very evident dark purplish lines or bands; by the presence of a small central cavity, which contains traces of pith; by the external surface of the meditullium presenting marked longitudinal elevations and corresponding depressions; by the greater thickness of their bark; and by the silky fibrous character which the inner bark presents when it is carefully broken across. The pieces of *aërial stems,* which, as we have mentioned, may be sometimes found in specimens of gelsemium, are readily known by their small size; somewhat purplish colour; their hollow centre; and by their silky fibrous inner bark, which character is at once seen when the external portion is stripped off or bruised; hence these fibres may be sometimes seen in commercial specimens projecting from the surface of the pieces of stem.

Composition.—The first published analysis of gelsemium is by Mr. Henry Kollock, of the United States, who found it to contain a small quantity of *volatile oil,* two *resinous substances, yellow colouring matter,* a peculiar alkaloid, which he termed *gelseminia, extractive matter,* various *salts,* and other unimportant ingredients. Subsequently examined by Wormley, an acid which he called *gelseminic acid* was also indicated as a constituent. Other experimenters failed to obtain any alkaloid from the wood, when this was separated from the bark; thus proving the greater activity of the bark, for Wormley and others have found that the activity of gelsemium resides essentially in the contained alkaloid, although no very definite experiments have been tried with the view of ascertaining the physiological action of the other ingredients. It was afterwards ascertained by the investigations of Fredigke, that gelseminic acid existed partly in a free state, and partly in combination with the alkaloid, forming a *gelseminate of gelseminia.* In a pure state *gelseminia* or *gelsemia* is a colourless amorphous solid, without odour, but with an intensely bitter taste, with strong basic properties, very sparingly soluble in water, although readily soluble in water acidulated with hydro-

chloric acid; and also soluble to some extent in alcohol, and more so in ether and chloroform. The *gelsemin* of the eclectic practitioners is a mixture of this alkaloid and resin. Gelseminia is a powerful poison. Ringer and Murrell are led to believe, from the physiological action of gelsemium, that it contains two alkaloids, one a paralysing agent, and the other a tetanising agent.

Gelseminic acid is described as consisting of transparent, slender, acicular, colourless crystals, without odour, and almost tasteless, and arranged in tufts or heaps. These crystals have acid properties and form crystallizable salts with bases. Gelseminic acid is but very sparingly soluble in cold water, but more so in hot water, and is readily soluble in chloroform or ether. Its aqueous solution is remarkable for its fluorescence, which can be observed even after very considerable dilution; and is much more manifest in an alkaline solution, which appears yellow by transmitted light, and blue by reflected light. This fluorescence may be even observed in water in which gelsemium has been digested for some hours. The fluorescence thus produced by gelseminic acid or gelsemium at once disappears on the addition of an acid to its solution, in which particular it differs from that of quinia. The remarkable analogies existing between this gelseminic acid of Wormley and æsculin, led Professor Sonnenschein to examine it very carefully, and he "thinks there can be no doubt that the acid reacting body prepared from gelsemium is perfectly identical with æsculin," which is obtained from the bark of the Horse Chestnut tree.

Medical Properties and Uses.—The action of gelsemium is essentially on the nervous system, on which it produces a sedative effect. Its action somewhat resembles that of hemlock, and like it, an overdose produces death by asphyxia. But Ringer and Murrell have recently shown that, in the case of a dog, if artificial respiration be maintained until the drug can be eliminated from the system, recovery will take place. Among other remedies that have been tried to counteract the poisonous effects of this drug we may mention galvanism, brandy, ammonia, and tannic acid. When locally applied to the eye gelsemium causes a marked dilatation

of the pupil; but when internally administered it first contracts, and then somewhat dilates the pupils.

Gelsemium has been found of especial value as a remedy in neuralgic pains of the face and jaws, particularly when arising from decaying teeth. In America it has been extensively employed for many years in fevers, more especially those of an intermittent character. The drug is also said to be most useful in the headache and sleeplessness of the drunkard, and in sick headache. It has also been used in pneumonia, pleurisy, rheumatism, neuralgia, dysmenorrhœa, spermatorrhœa, hysteria, chorea, epilepsy, gonorrhœa, spasmodic stricture of the urethra, spasmodic croup, influenza, and many other affections. Doubtless its virtues have been exaggerated, but there can be no question that gelsemium is a drug of much power, and that it is a useful addition to our materia medica.

U. S. Disp., by W. & B., p. 421; Eclectic Dispensatory, p. 186; Grover Coe's Concentrated Organic Medicines, p. 129; Garr., Mat. Med., p. 310; Procter, in Amer. Journ. Pharm., 1852, p. 307; Wormley, in Amer. Journ. Pharm., 1870, p. 29; Fredigke, in Proc. Amer. Pharm. Assoc., 1873, p. 652; Amer. Journ. Pharm., 1870, p. 14; Sonnenschein, in Pharm. Journ., ser. 3, vol. vii, p. 269; Eberle, in Amer. Journ. Pharm., 1869, p. 38; Bartholow, in Practitioner, Oct., 1870, p. 200; Wickham Legg, in Lancet, May, 1874; Sawyer, in Pharm. Journ., ser. 3, vol. iv, p. 998; Brit. Med. Journ., 1874, p. 576; Holmes, in Pharm. Journ., ser. 3, vol. vi, pp. 481, 521, 561, and 601, with figures; Series of Papers in Lancet, by Ringer and Murrell, vol. ii (1875), and vols. i and ii (1876).

DESCRIPTION OF PLATE.

Drawn from a specimen collected in Florida by Chapman; the fruit from Plukenet's Herbarium; both in the British Museum.

1. A flowering branch.
2. Peduncle and calyx.
3. Corolla laid open.
4. Stigmas.
5. Vertical, and—6. Transverse section of ovary.
7. Fruit after dehiscence.
8. Seed.
9. Section of the same.

(2, 4–6, 8, 9 enlarged.)

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D.Blair F.L.S. ad nicc. del. et lith.

GENTIANA LUTEA, *Linn.*

Harbam imp

N. Ord. GENTIANACEÆ. Lindl., Veg. Kingd., p. 612; Le Maout and Dec., p. 558.

Tribe *Swertieæ*.

Genus Gentiana,* *Linn.* B. & H., Gen. Plant., ii, p. 815. A large genus of over 180 species, natives chiefly of temperate regions in both hemispheres.

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182. Gentiana lutea,* *Linn., Sp. Plant., ed.* 1, *p.* 227 (1753).

Yellow Gentian. Great Gentian.

Figures.—Woodville, t. 95; Nees, t. 199; Steph. & Ch., t. 132; Hayne, xiii, t. 28; Berg & Sch., t. 26 a; Reichenb., Ic. Fl. Germ., vii, t. 1059 (bad).

Description.—A large herbaceous perennial, with a slightly developed root-stock, which is branched above and gives off both barren and flowering stems, and passes below into a large, hard, pale, yellowish-brown root, reaching a great length (even as much as 4 feet), branched, cylindrical, about 1½ inch in diameter, transversely marked with slender parallel folds. Flowering-stem 3—4½ feet high, erect, stout, cylindrical, solid below, hollow above, quite smooth, pale yellow-green. Leaves opposite, connate at the base, those of the barren shoots forming long sheaths which enclose one another and much exceed the very small, conical, terminal bud, large, the lowest ones more than 1 foot long, those of the flowering-stems in 4 or 5 pairs, decussate, the lower ones very shortly stalked, connate, and forming short sheaths, the upper one sessile and cordate at the base, all ovate, acute, entire, quite glabrous, bright yellowish-green, paler and more glaucous beneath, with 5—7 strong ribs sharp and prominent beneath, the midrib strongest. Flowers numerous, large, on long, slender, smooth pedicels, arranged in irregular cymes of 20 or more in the axils of a pair of opposite, large, leafy, broadly ovate, concave, reflexed bracts, and forming thus 5 or 6 large, distant, dense whorls, and a terminal one; cymes two in each axil, a small one

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* *Gentiana*, γεντιάνη, the classical name for the present species.

of 3 flowers immediately above the large bract besides the main one, which has a central terminal flower, and two or more divaricate or reflexed branches on each side, each bearing 3 flowers, and a long, leafy, pale yellowish-green bractlet. Calyx membranaceous, thin, semi-transparent, quite enclosing the corolla in the narrow, oblong, pointed bud, splitting down one side, and turning over like a spathe when in flower, smooth, very pale green, teeth very short, only two obvious, leafy, spreading in the bud. Corolla 2 inches in diameter, widely spreading, divided very nearly to the base into 6 narrowly oblong, acute segments, convolute in æstivation, pale orange-yellow, persistent. Stamens 5, inserted on the corolla, and a little shorter than its segments, persistent, filaments spreading, pale green; anthers erect, nearly as long as the filaments, linear, acute, cream-coloured. Pistil about as long as the stamens, greenish-yellow, smooth; ovary oblong-linear, tapering, 1-celled, with numerous flat, thin, circular, horizontal ovules attached to 2 parietal placentas; style short, tapering; stigmas 2, short, recurved, yellow. Fruit a dry capsule, shortly stalked, surrounded by the withered parts of the flower, about $1\frac{1}{4}$ inch long, oblong, tapering, quickly dehiscent in a septicidal manner into two elastic, somewhat recurved valves. Seeds numerous, slightly attached and soon shed, thin, flattened, circular-oval, winged all round; embryo small at base of the endosperm.

Habitat.—This fine plant is a well-known and striking native of the alpine and sub-alpine pastures of Central and Southern Europe, but does not reach the northern countries of the continent nor the British Islands. It is a characteristic species of many parts of France and Switzerland, at an elevation of from 3000—4500 feet, flowering in June to August. Even when not in flower the numerous barren shoots form conspicuous objects; the leaves are at first sight very similar to those of *Veratrum album*, which is its frequent companion. Out of Europe the plant occurs in the mountains of Lydia and the Bithynian Olympus. *G. lutea* has been grown in English gardens since the time of Gerard, and is a highly ornamental plant. It is, however, rather shy of

flowering, at all events near London. The large star-like corollas are sometimes marked with rows of small brown spots, or altogether red in colour. With two allied species which often accompany it, *G. purpurea*, L., and *G. punctata*, L., the present species forms natural hybrids; these are known under the names *G. Thomasii* (*luteo* × *purpurea*) and *G. Charpentieri* (*luteo* × *punctata*).

Grisebach, in DC. Prod., ix, p. 86; Gren. & Godr., Fl. France, ii, p. 488; Boissier, Fl. Orient., iv, p. 69; Lecoq, Études Géogr. Bot., vii, p. 399; Lindl., Fl. Med., p. 519.

Official Part and Names.—Gentianæ Radix; the dried root (B. P.). The dried root (I. P.). Gentiana; the root (U. S. P.).

Collection and Commerce.—Gentian root is collected and dried in the mountainous districts of Central and Southern Europe. It is imported into this country from Germany, and also, to some extent, from Marseilles.

General Characters and Composition.—Gentian root of commerce is in more or less cylindrical, twisted pieces, which are either simple or branched below, and vary in length from a few inches to a foot or more, and in thickness from half an inch to about an inch. The larger pieces are often found split longitudinally, which has been done to facilitate their drying; and the crown of the root when present, is somewhat enlarged, and covered with the dried scaly bases of the leaves which it once bore. Externally the roots are marked with irregular longitudinal furrows, and by closely set annular wrinkles, the latter being more especially found in their upper portion. In colour they are yellowish-brown or brownish on their outer surface, and reddish or somewhat of an orange tint internally. They are tough and flexible; and when cut transversely the exposed surface shows a thick reddish bark, separated by a dark-coloured cambium zone from a central woody column, which is soft and spongy, and has no pith. The odour is heavy, peculiar, and disagreeable; and the taste at first sweetish, but ultimately very bitter.

The more important constituents of gentian root are from 12 to 15 per cent. of *uncrystallizable sugar*, a large amount of *pectin*, a

little *volatile oil*, and two crystalline bodies, termed *gentiopicrin* or *gentian bitter*, and *gentianic* or *gentisic acid*. It contains no starch. The active constituent of gentian is *gentiopicrin*; this is the same principle which in an impure state was formerly termed *gentianin* or *gentianite*. It is a neutral body, crystallizing from the fresh root, which contains about $\frac{1}{10}$th per cent. in colourless needles; which are soluble in water and dilute spirit of wine, but insoluble in ether. By the action of dilute mineral acids *gentiopicrin* is shown to be a glucoside, as it is then resolved into *glucose*, and an amorphous, neutral, yellowish-brown substance, termed *gentiogenin*. *Gentianic* or *gentisic acid*, the other crystalline constituent, appears to be inert; it occurs in pale yellow, silky, needle-shaped crystals, which are but very slightly soluble in water or ether, but soluble in alcohol. Gentianic acid forms salts with alkalies. An infusion of gentian in cold water, owing to the presence of sugar, undergoes the vinous fermentation, and yields by distillation a spirituous liquor.

Adulterations and Substitutions.—From the careless manner in which gentian roots are collected, it is said, that on the Continent, several other roots or rhizomes are occasionally found intermixed with them, such as aconite, belladonna, white hellebore, orris, &c., but none of these are yellow internally, and, therefore, by this and other marked characters they are readily distinguished from the true roots.

The roots of *Gentiana purpurea*, *G. Pannonica*, and *G. punctata*, are also sometimes used as substitutes for our official gentian in parts of the Continent, and are not unfrequently mixed with them. Their intermixture is, however, of little real importance, as they all possess analogous properties to it; and, indeed, *Gentiana Pannonica* is official in the Austrian Pharmacopœia. These roots are not easily distinguishable in all cases from the official roots; but those of *G. purpurea* are darker brown internally, have no annular wrinkles, and their crown frequently presents a branched appearance from bearing the remains of many aerial stems. The roots of *G. punctata* have the same annular wrinkles as the true roots, but they have a paler yellow colour externally, and are not

so red internally. The roots of *G. Pannonica* are said to agree generally in their characters with those of *G. purpurea,* but not to acquire the same length or thickness.

Medical Properties and Uses.—Gentian is a pure or simple bitter, and hence acts as a stomachic tonic by giving tone to the stomach and improving the appetite. It is a valuable remedy in debility, in convalescence from acute diseases, and in some forms of dyspepsia, more especially when the stomach is in an atonic condition. It was formerly held in much repute in the treatment of intermittents; and was also regarded as a remedy of great value in gout, on which account it formed an important constituent in the once celebrated remedy for that disease named *Portland powder.* Gentian root is also used to some extent in veterinary medicine.

Powdered gentian is an ingredient in some of the compositions now sold as cattle foods; and gentian spirit, already referred to in speaking of the composition of gentian root, is much relished in Switzerland and Southern Bavaria.

Gentiana Catesbæi, *Elliot.*—The root of this plant, under the name of Blue Gentian, is official in the *Secondary List* of the Pharmacopœia of the United States.

Blue Gentian is a native of North and South Carolina; and its roots when dried closely resemble in taste those of the official European Gentian.

In its properties it is said to be little inferior to Yellow Gentian, and hence is sometimes employed by practitioners in the Southern States of the American Union, for similar purposes.

Per. Mat. Med., vol. ii, pt. 1, p. 623; Pharmacographia, p. 390; Christison, Dispensatory, p. 461; U. S. Disp., by W. & B., p. 423; Per. Mat. Med., by B. & R., p. 640; Gmelin, Chemistry, vol. xvi (1864), p. 193; Tuson, Veterinary Pharmacopœia, p. 110; Martius, in Pharm. Journ., vol. xii, ser. 1, p. 371; Amer. Journ. Pharm., vol. xxxv, p. 330, and July, 1868, p. 333.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in the Pyrenees by Fourcade.

1. Lower portion of a plant with root.
2. Upper part of flowering stem.
3. A flower bud.
4. Corolla laid open.
5. Pistil.
6. Vertical, and—7. Transverse section of the same.
8. Ripe capsule.
9, 10. Seed.

(5–7, 10 enlarged.)

D Blair ad nat. del. et lith.

OPHELIA CHIRATA, *Grisebach.*

N. Ord. GENTIANACEÆ.

Tribe *Swertieæ*.

Genus **Ophelia**,* *Don.* DC. Prod., ix, pp. 123–7. Species 18 or 20, natives of India, and a few in China and Australia.

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183. Ophelia Chirata,† *Grisebach, Gen. & Spec. Gent., p.* 320 (1839).

Chiretta. Chirayta.

Syn.—Gentiana Chirayita, *Roxb.* G. floribunda, *Don.* Ophelia lurida, *Don.* Agathotes Chirayta, *Don.*

Figures.—Wallich, Plant. Asiat. Rar., iii, t. 252.

Description.—A large annual (?) herb, reaching 5 feet in height, with a thick, tapering, scarcely branched root. Stem erect, branched in the upper part, stiff, smooth, cylindrical below, bluntly quadrangular above, slightly thickened at the nodes, with a very large pith, often hollow in the lower part. Leaves ovate or ovate-lanceolate, opposite, sessile, smooth, rounded, and semi-amplexicaul at the base, acuminate at the apex, the largest 4 inches long, very much smaller on the branches, with 5 or 7 parallel curved nerves prominent below. Inflorescence consisting of numerous small axillary, opposite, lax cymes (often reduced to a single flower) arranged on the short branches and the termination of the stem, the whole forming an elongated tapering panicle 2 feet in length; flowers small, stalked. Calyx deeply divided into 4 linear acute segments, smooth. Corolla nearly twice as long as the calyx, divided nearly to the base into 4 ovate-lanceolate, strongly acuminate, erect segments, each provided on the upper surface with a pair of "nectaries" covered by pouch-like, oblong scales which terminate in long fringes, persistent. Stamens 4, shorter than the corolla, and inserted at its base, filaments tapering. Pistil of two carpels, ovary compressed, one-celled, tapering into

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* Name from ὀφέλλειν, to bless, from its valuable properties.

† The Kirâtas are "an outcast race of mountaineers in the north of India," among whom this plant was used.

the short style which terminates in two slender recurved stigmas, ovules numerous, inserted on two double (sutural) parietal placentas. Fruit a small one-celled capsule, pericarp transparent, yellowish, dehiscing from above septicidally into two valves. Seeds very numerous, minute, many-sided, angular, testa pitted, embryo very small in fleshy endosperm.

Habitat.—This species is found in the mountainous parts of North India, Sikkim, Kumaon, Khasia, and especially Nepal, at an altitude of 5000—9000 feet. It may be readily distinguished from the other species, many of which have a strong superficial resemblance, by its minute seeds, tetramerous flowers, and double nectaries. The size of the corolla varies, and is sometimes scarcely longer than the calyx; it also presents some difference in colour, being described as yellow, greenish, or purplish, or as combining these colours, by different authors. Wallich's figure above quoted is probably this species, but the characteristic nectaries are entirely omitted. The plant is not yet in cultivation in this country.

Roxb., Fl. Indica, ii, p. 71; Grisebach, in DC. Prod., ix, p. 127; C. B. Clarke, in Journ. Linn. Soc. Lond., xiv, p. 447; Lindl., Fl. Medica, p. 519.

Official Part and Names.—CHIRATA; the entire plant (B. P.). The entire plant (*Chirata, Chiretta*), collected when the fruit begins to form (I. P.). CHIRETTA; the herb and root of Agathotes Chirayta, *Don*, (U. S. P.).

Collection, General Characters, and Composition.—The entire plant is collected about the time the flowers begin to decay, or rather when the fruit begins to form; it is then commonly tied up with a slip of bamboo into flattish bundles, each of which is about 3 feet long, and from 1½ to 2 lbs. in weight. The stems have an orange-brown or purplish colour, and an average thickness of that of a goose-quill; the roots are usually simple and tapering, and from 2 to 4 inches long, and frequently half an inch thick. The stems are rounded below and throughout nearly their whole length, and very faintly quadrangular above, and are branched in a decussate

manner. A transverse section of the stem exhibits a thin woody ring, enclosing a large continuous easily separable pith, which is yellowish in colour. The whole plant is intensely bitter, but has no odour.

The analysis of Höhn shows that Chiretta contains two bitter principles, which he has named *Ophelic acid* and *Chiratin;* and also a tasteless, yellow, crystalline substance, which he obtained in too small a quantity for a thorough investigation.

Substitutes.—In the Indian bazaars several other plants are known by the name of *Chiretta* or *Chirayta,* besides the true drug, and possess to a greater or less degree its bitter tonic properties. Thus, *Ophelia angustifolia,* Don, *O. elegans,* Wight, *O. densifolia,* Griseb., and *O. multiflora,* Dalzell; *Exacum tetragonum,* Roxb., *E. bicolor,* Roxb., and *E. pedunculatum,* Linn.; and *Slevogtia orientalis,* Griseb., all of which are Gentianaceous plants, are so characterised; as also *Andrographis* (*Justicia*) *paniculata,* Wall., of the natural order Acanthaceæ, which is described in its proper place, is so designated. It is, therefore, somewhat remarkable, considering the number of substitutes for the true Chiretta, which are thus known in India, that some of them should not have found their way, accidentally or intentionally, into other parts of the world; but none such have been described until one of us noticed at the end of the year 1874, the substitution of the plant of *Ophelia angustifolia,* Don, which is called in India *Puharee* (hill) *Chiretta,* for that of the true Chiretta, and the substitution is still to be found in this country. This spurious Chiretta may be readily distinguished from that of the true drug by the far less bitter taste of its infusion; by its stems being evidently quadrangular and somewhat winged throughout their whole length; and by their transverse section exhibiting a thick woody ring on the outside, and with the centre hollow or presenting but faint traces of pith.

Medical Properties and Uses.—Chiretta is highly valued in India as a powerful and pure bitter tonic, without aroma or astringency; but it is comparatively little used in this country, and but very slightly so on the Continent, and in the United States. It is, however, more bitter than Gentian, and may be employed in

similar cases to it. It is reputed to be especially serviceable in the dyspepsia of gouty subjects. It is sometimes employed instead of Gentian to impart flavour, &c., to cattle foods.

Pharmacographia, p. 392; U. S. Disp., by W. & B., p. 258; Pharm. of India, p. 149; Royle's Bot. of the Himalayan Mountains, p. 277; Archiv der Pharmacie, 189 (1869), p. 229; Bentley, in Pharm. Journ., vol. v, 3rd ser., p. 481.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum collected in Nepal by Wallich (no. 4372 B).

1. Portion of flowering panicle.
2. Lower part of stem, with root.
3. A flower.
4. Corolla spread open.
5. Pistil.
6. Transverse section of ovary.
7. Fruit, showing persistent corolla.
8. Seeds.

(3–7 enlarged; 8 much magnified.)

D'Ehart Fils ad nat. del. et lith.

MENYANTHES TRIFOLIATA, *Linn.*

M & N Hanhart imp.

N. Ord. GENTIANACEÆ.

Tribe *Menyantheæ.*

Genus Menyanthes,* *Linn.* B. & H., Gen., ii, p. 819. Species 2, natives of temperate and cold parts of the Northern Hemisphere.

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184. Menyanthes trifoliata, *Linn., Sp. Plant., ed.* 1, *p.* 145 (1753).

Buckbean.

Figures.—Woodville, t. 97; Hayne, iii, t. 14; Steph. & Ch., t. 85; Nees, t. 204; Bigelow, t. 46; Berg & Sch., t. 10 d; Syme, E. Bot., vi, t. 920; Curt., Fl. Lond., fasc. 4; Reich., Ic. Fl. Germ., xvii, t. 1043; Nees Gen. Fl. Germ.

Description.—A perennial herb, with long, creeping or prostrate, sparingly branched, indefinite rhizomes, which are ¼—½ inch in diameter, cylindrical, succulent, smooth and shining, green or white, in the lower part ringed with leaf-scars, and give off above the nodes numerous long, stout, cylindrical, fleshy roots, at first simple, but when older with many matted slender branches. Leaves alternate, on long, erect, cylindrical, smooth petioles dilated at the base into thick, membranous, dilated sheaths completely surrounding the stem at their insertion, trifoliolate, leaflets nearly sessile, erect, equal, 1½—3 inches long, oval, oblong-oval, or oblong-obovate, obtuse, entire or slightly crenate, thick, glabrous, pale, somewhat glaucous green, rather shining beneath, with the thick midrib paler. Flowers few, rather large, on stout glabrous pedicels arranged in erect, somewhat pyramidal, lax, blunt racemes about 3 inches long, and terminating naked peduncles arising from the axils of the previous year's leaves, which they equal or a little exceed; bracts ovate, membranous, obtuse, shorter than the pedicels. Calyx deeply cut into 5 oblong-oval, obtuse segments,

* *Menyanthes;* altered from *μηνίανθος*, the name of a three-leaved marsh plant in Theophrastus, and first applied to the present species by Dalechamps in 1587. The correct orthography is probably *μινυανθής*, meaning with quickly falling flowers.

glabrous, persistent. Corolla deciduous, thick, pink outside, white within, with a wide funnel-shaped tube about as long as the calyx and 5 triangular-oblong, subacute, recurved segments, glabrous externally and covered internally, except the ends, with numerous crowded, large, thick white hairs, valvate in æstivation. Stamens 5, inserted in the tube of the corolla, anthers sagittate at base, purplish red. Ovary smooth, 1-celled, with numerous ovules on 2 parietal placentas, style simple, persistent, stigma 2-lobed. Capsule ovoid-globular, about $\frac{3}{8}$ inch long, blunt, tipped with the persistent style, smooth, pale brown, pericarp thin, dehiscing loculicidally and irregularly. Seeds numerous, ovoid, somewhat compressed, very smooth, shining and polished, pale brownish orange, embryo straight in axis of endosperm.

Habitat.—A native of the temperate regions of the Northern Hemisphere, with a very extensive area of distribution in both the Old and New Worlds. It is found throughout Europe, except the extreme south-west, in the Caucasus Mountains, and over all Northern Asia to North-west India; northwards it passes into the Arctic circle in both Europe and Asia, and is a frequent plant in high latitudes, reaching Iceland and Southern Greenland. In North America it extends throughout Canada and the Northern United States as far south as New England and Pennsylvania. In the British Isles it is found commonly in Scotland and the north, and more rarely in the southern counties, growing in bogs and marshes, which it ornaments in early summer with its singular and beautiful flowers. There is great variation in the size of the leaves and their width, according to locality. The flowers present well-marked dimorphic conditions, those figured being the form with long style and short stamens.

Hook. f., Stud. Fl., p. 242; Syme, E. Bot., vi, p. 79; Watson, Comp. Cyb. Brit., p. 249; Griseb., in DC. Prod., ix, p. 137; A. Gray, Man. Bot., N. U. States, p. 390; Boiss., Fl. Orient., iv, p. 64; Ledebour, Fl. Rossica, iii, p. 76; Lindl., Fl. Med., p. 523.

Part Used and Name.—MENYANTHES; the leaves. These leaves are not official in the British Pharmacopœia, the Pharmacopœia of India, or the Pharmacopœia of the United States; but they

were formerly recognised in the London, Edinburgh, and Dublin Pharmacopœias. The common name of this drug is Buckbean or Bogbean.

General Characters and Composition.—The whole plant has a very bitter taste, but no marked odour. The bitter taste is, however, most evident in the rhizome and leaves, but the latter are usually employed, and were alone official. An infusion of Menyanthes becomes green on the addition of a solution of perchloride of iron. The bitterness is preserved in the dried plant.

Buckbean was examined many years since by Trommsdorff, who found its essential constituents to be *bitter extractive, albumen, brown gum, fecula, malic acid, acetate of potash,* and a *peculiar matter,* which is precipitated by tannic acid. The essential constituent is doubtless the *bitter principle;* this is supposed to be identical, or closely allied to that contained in *Gentiana lutea,* and has been termed *menyanthin.* It is said to be a neuter principle, with a pure bitter taste, soluble in alcohol and water, but insoluble in ether. It may be obtained for use, although not chemically pure, "by treating the alcoholic extract of the plant with hydrated oxide of lead, removing the lead by hydrosulphuric acid, filtering and evaporating the liquor, exhausting the residue with alcohol, and again evaporating with a gentle heat." Kromayer and Froehde have given a process for obtaining it in a pure state; they describe menyanthin as a white powder, uncrystallizable, very bitter, and without action on vegetable colours.

Medical Properties and Uses.—Buckbean is tonic like the other ordinary bitter tonics, but in large doses it is also cathartic, and sometimes emetic. It was formerly a medicine of great repute in this country and other parts of Europe, and was also employed to some extent in the United States. It is interesting from the fact of its being indigenous in this country and the United States, on which account more especially, it is described by us, as its properties are similar to gentian, and may therefore be substituted for it. It has been given in dyspepsia, intermittent fevers, rheumatism, worms, scurvy, some cutaneous diseases, and other affections. At present, however, it is never used

except in domestic practice; for, like many other of our native remedies, it has been superseded by drugs of foreign origin.

Buckbean was formerly employed in Lapland as a substitute for hops; and it is still so used in Silesia and some other parts of Germany. In Lapland the powdered rhizomes have been, in times of scarcity, mixed with meal for making bread; but upon this bread Linneus has bestowed the epithet, "amarus et detestabilis." Linneus, however, informs us in his 'Flora Lapponica,' that in times of scarcity flocks will subsist on this plant, notwithstanding its bitterness.

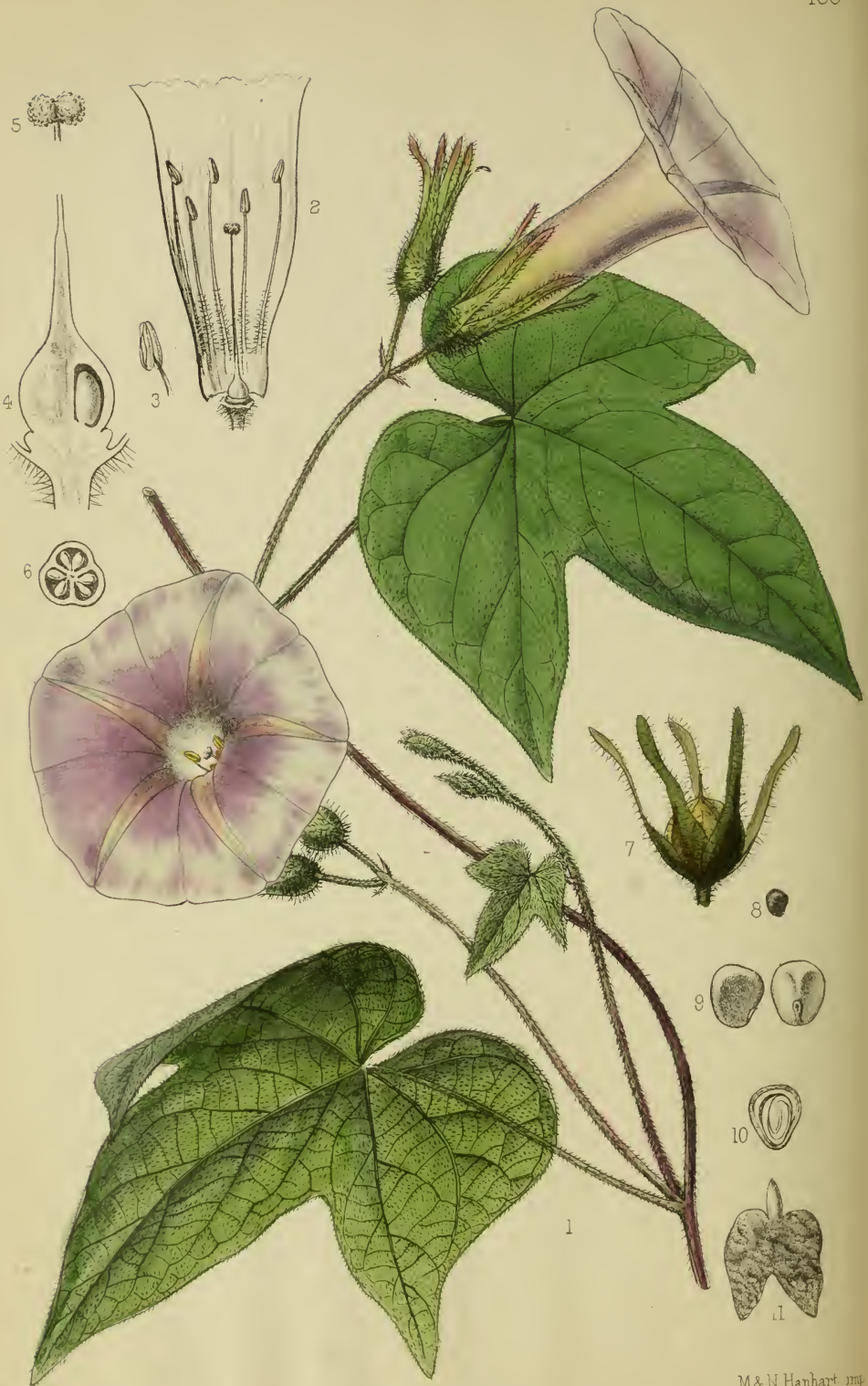
Per. Mat. Med., vol. ii, pt. 1, p. 630; Steph. & Church., Med. Bot., by Burnett, vol. ii, pl. 85; U. S. Disp., by W. & B., p. 1640; Thomson's London Dispensatory, by Garrod, p. 465; Brandes, in Pharm. Journ., vol. ii, ser. 1, p. 660, from Arch. der Pharm., xxx, pp. 153—159; Kromayer & Froehde, in Pharm. Jl., vol. iii, ser. 2, p. 579, from Journal de Pharmacie et de Chimie.

DESCRIPTION OF PLATE.

Drawn from specimens collected at Hampstead, near London.

1. Portion of a plant with leaves and flowers.
2. A flower.
3. Vertical section of the same.
4. Ovary.
5. Transverse section of the same.
6. A raceme of fruits.
7, 8. Seeds.
9. Section of the same.

(2–5, 8, 9, enlarged.)



L Blair F.L.S. ad sicc. del. et lith.

M & N. Hanhart imp.

IPOMÆA NIL, *Roth.*

N. Ord. Convolvulaceæ. Lindl., Veg. Kingd., p. 630; Le Maout & Dec., p. 565.

Genus Ipomœa,* *Linn.* B. & H., Gen., ii, p. 870. Species (including those of *Calonyction*, *Exogonium*, *Quamoclit*, *Pharbitis*, &c.), over 300, inhabitants of the hotter regions of both hemispheres; absent from Europe.

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185. Ipomœa Nil,† *Roth, Catalecta Botan.*, i, *p.* 36 (1797).

Kaladana (India).

Syn.—Convolvulus Nil, *Linn.* C. hederaceus, *Linn.* Pharbitis Nil, *Choisy* Ipomœa cœrulea, *Koenig.*

Figures.—Dillenius, Hort. Eltham., t. 80; Bot. Mag., t. 138.

Description.—An annual herb. Stems twining, reaching 12 feet in length, slender, cylindrical, hairy with rather long deflexed hairs, branched. Leaves alternate, on very long hairy stalks, without stipules, blade variable in size and form, usually 2—3 inches long and about the same in width, deeply cordate at the base, more or less deeply cut into 3 acute lobes, margin entire, dark green, pale beneath, hairy, downy or nearly smooth. Flowers large, shortly stalked, usually 2 together on stout hairy peduncles from the axils of the leafstalks which they about equal in length; bracts small, opposite, linear, at the base of the pedicels. Sepals 5, very strongly imbricated, erect, slightly connected below, oblong-ovate at the base with the points linear, much attenuated, the inner ones narrower, slightly hairy. Corolla large, salver-shaped, tube about 1½ inch long, cylindrical, somewhat gibbous, narrowed below, limb spreading, somewhat recurved, about 2 inches across, margin nearly circular, almost entire, slightly emarginate at the folds, twisted in æstivation, usually bright pale blue. Stamens 5, inserted near the base of the corolla-tube, filaments included in the tube, unequal two being shorter, hairy at the base, anthers

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* *Ipomœa*, from ἴψ, convolvulus, and ὅμοιος, like (see Linnæus, Hort. Cliffort., p. 66).

† "*Nil* in Hindustani signifies blue." The name was first used for this plant by the Arabian physicians.

small. Ovary surrounded by a small entire annular disk, 3-celled, with two ascending ovules in each cell, style shorter than the stamens, thickened at the base, stigma with 2 rounded papillose lobes. Fruit a nearly globose capsule, about $\frac{1}{2}$ inch in diameter, surrounded by the persistent calyx and tipped with the rigid base of the style, smooth, pale brown, 3-celled, pericarp thin, chartaceous, dehiscing longitudinally into 3 valves. Seeds somewhat triangular, rounded on the back, flattened on the sides which unite to form a blunt keel in front, nearly black, dull, nearly $\frac{1}{4}$ inch long, testa rather thick, embryo with large bifid, foliaceous, folded and crumpled cotyledons, and a somewhat curved, pointed, superior radicle ; no endosperm.

Habitat.—This pretty plant is frequently met with in the tropical and warm regions of both the Old and New Worlds. In Africa it extends from Abyssinia to the Cape of Good Hope, and in America as far north as Maryland. In India it is very abundant in nearly all parts. What is probably the same species is found commonly in many of the Pacific Islands.

It was grown in English gardens in the time of Gerard and Parkinson, but is now very rarely to be met with ; the universal *P. hispida* having taken its place.

It flowers in the autumn. There are many varieties. The flowers, which change from pale blue to purple, are sometimes pink or white.

Roxburgh, Fl. Indica, i, p. 501; A. Gray, Man. Bot. U. S., p. 375; Choisy, in DC. Prod., ix, p. 343; Lindl., Fl. Med., p. 398.

Official Part and Names.—Pharbitis Semina, Kaladana ; the seeds of Pharbitis Nil, *Choisy* (I. P.). These seeds are not official in the British Pharmacopœia, or the Pharmacopœia of the United States.

General Characters and Varieties.—These seeds are the *Habb-ul-nil* of the Arabian physicians, and are commonly known in the bazaars of India under the Hindustani name of *kala-dana,* which signifies literally *blackseed.* The ordinary variety met with

according to Waring, and described by him in the Pharmacopœia of India, consists of seeds which are about a quarter to one third of an inch in length, and weigh on an average about half a grain each. They are of a black colour, except at the hilum, which is brown and somewhat hairy; each seed is angular, and its form that of the segment of an orange. When chewed they have at first a sweetish, somewhat nutty taste, but this is succeeded by a disagreeable acridity; their odour when fresh is peculiar, heavy, and somewhat earthy, but this is lost in a great measure by keeping. The above variety of *kaladana* corresponds to the small variety imported from Calcutta, of Flückiger and Hanbury. The same authors describe another variety of kaladana, which agrees in every respect with the former, except that the seeds weigh nearly a grain each.

Substitute.—According to Dr. Dymock, the *Tukm-i-Nil* of Persia are now imported into Bombay in considerable quantities, and have to a great extent displaced the native drug. These seeds are about $\frac{1}{3}$ of an inch in length by about $\frac{1}{4}$ of an inch in breadth, and their form is that of the segment of an orange with rounded angles; they have a dark brown thick testa; and each weighs about 3 grains. Hence they can be readily distinguished from the Indian Kaladana by their larger size, lighter colour, and thick testa. Their botanical source has not been ascertained; although doubtless from some nearly allied Convolvulaceous plant to that yielding the official Kaladana. Their medical properties and uses seem to be the same as the true drug.

Composition.—The two principal constituents of kaladana are about 14 per cent. of a *fixed oil*, and a *resin*. The fixed oil has an acrid taste, a light brown colour, and concretes at about 64°. The resin, which has been called *pharbitisin*, is the active principle. It is soluble in alcohol, but insoluble in ether, and in its reactions generally it agrees with *convolvulin* or the resin of the official jalap, which is described under "Exogonium Purga." It melts at about 320°. As prepared for medicinal use it has a yellowish or brownish colour, a nauseous acrid taste, and a disagreeable odour, more especially when heated.

Medical Properties and Uses.—These seeds are much used in India, where they are regarded as an effectual, quickly operating, safe cathartic, closely resembling true jalap, for which they form a good substitute, although they are not quite so active. The dose of the powdered seeds, as given in the Pharmacopœia of India, is from thirty to fifty grains. Dr. Kirkpatrick regards kaladana as intermediate in strength between rhubarb and jalap. In many parts of India the roasted seeds are taken by the natives as a purgative. In consequence of the largeness of the dose the resin is frequently substituted for the seeds, and is said to be a safe and efficient purgative in doses of from five to eight grains. Other preparations of kaladana are given in the Pharmacopœia of India, which may be employed as substitutes for the corresponding preparations of jalap of the British Pharmacopœia.

Pharmacographia, p. 403; Pharmacopœia of India, pp. 155 & 459; Waring, in Pharm. Journ., vol. vii, ser. 2, p. 498; Roxburgh, Fl. Ind., 1st edit., vol. ii, p. 91; O'Shaughnessy, Bengal Dispensatory, p. 505; Dymock, in Pharm. Journ., vol. vii, ser. 3, p. 190.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum collected in India and Ceylon.

1. Part of a stem with flowers.
2. Tube of corolla laid open.
3. Anther.
4. Vertical section of ovary.
5. Stigma.
6. Transverse section of ovary.
7. Fruit.
8. A seed.
9. Seeds.
10. Vertical section of the same.
11. Embryo unfolded.

(3–6, 9–11 enlarged.)

D.Blair ad nat. del. et lith.

EXOGONIUM PURGA, *Benth.*

N. Ord. Convolvulaceæ.

Genus **Exogonium**,* *Choisy*. Choisy, in DC. Prod., ix, pp. 346-7. Species 8 or more, natives of the W. Indies and tropical America.

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186. Exogonium Purga,† *Benth., Plant. Hartweg., p.* 46 (1839).

Jalap.

Syn.—Ipomæa Purga, *Hayne*. I. Jalapa, *Nutt.* (non *Pursh*). Convolvulus Purga, *Wenderoth*. C. Jalapa, *Schiede* (non *Linn.*).

Figures.—Nees, Supp.; Hayne, xii. tt. 33, 34; Berg & Sch., t. 5 a, b; Bot. Mag., t. 4280; Zuccarini, Pl. Nov., fasc. i, t. 12.

Description.—An herbaceous perennial twiner. Stems numerous, slender, twisted and furrowed, twining, smooth, purplish, reaching 12 feet or more in length, moderately branched, arising from the crown of fleshy tubercular roots, which are nearly globular, tapering below into a fibrous termination, reaching the size of an orange or small turnip but usually smaller, brown and finely mottled or spotted externally, white within. Leaves alternate, without stipules, on thick stalks nearly as long as themselves, 4 or 5 inches long, deeply cordate at the base with pointed lobes, attenuated at the apex, quite entire, smooth on both surfaces, paler below, veiny. Flowers in small axillary cymes usually of 3 flowers, on long wiry twisted peduncles, pedicels with small bracts at base, about half an inch long, thickened upwards. Calyx short, ovoid, smooth, cut into 5 oblong, blunt, imbricate segments, the two outer shorter, margins membranous. Corolla large, salver-shaped, glabrous, the tube about 2 inches long, slender, slightly wider above, again contracted where it joins the limb, which is nearly horizontal, about 2½ inches across, somewhat undulated, of 5 broad truncate segments scarcely separated by a faint notch, and marked down the centre by a tapering band, twisted in æstivation, deep, dull, purplish-pink. Stamens 5, inserted near

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* *Exogonium*, from the stamens projecting out of the corolla.

† *Purga*, the Spanish name of the drug, from its action.

the base of the tube, filaments somewhat flattened, 3 longer than the other two, all somewhat exserted beyond the throat of the corolla and towards one side, anthers small, introrse. Ovary tapering into the slender style which extends a very little beyond the stamens, 2-celled, surrounded by an annular disk; stigma of two rounded papillose lobes; ovules 2 in each shell. Fruit not seen.

Habitat.—This grows in damp, rich, shady woods in the mountainous country near Jalapa* in West Mexico, at an elevation of about 6000 feet above sea level. It was introduced into the Edinburgh Botanic garden in 1838, and is now to be met with pretty generally. As an ornamental plant it has considerable claims to notice, being easily propagated and flowering in the open air with but slight shelter from September till checked by the first frosts. It is not, however, able to ripen its fruit here, nor have we met with any description of it. The tubercles are hypertrophied roots, and are usually accompanied by ordinary fibrous ones and often by some intermediate in character. Subterranean white horizontal shoots are also given off from the crown of the tubercles.

Choisy, the monographer of the *Convolvulaceæ,* places this in *Ipomœa,* but the long corolla tube and exserted stamens are at variance with the characters of that genus as given by him.

D. Hanbury has described and figured (Journ. Linn. Soc., Bot. xi, p. 279, t. 2), under the name of *Ipomœa simulans,* the plant which yields the Jalap of Tampico, a coast town of Mexico, north of Jalapa. Another sort called Orizaba root, from the place of that name, is the produce of *I. orizabensis,* Ledanois.

Choisy, in DC. Prod., ix, p. 374; Balfour, in Bot. Mag., t. 4280 Lindl., Fl. Med., p. 396.

Official Part and Name.—JALAPA; the dried tubercules (B. P.). The dried tubercules (*Jalapa*) (I. P.). JALAPA; the tuber (U. S. P.).

Collection and Commerce.—In Mexico, whence the official jalap is obtained, the tubercules are dug up, to some extent, during the

* Whence the drug gets its name of Jalap.

whole year; but principally in the spring when the young shoots begin to appear. The roots (tubercules) are then placed in nets, and dried by the aid of fire heat. The smaller tubercules are dried entire; but the larger ones are more or less incised to facilitate desiccation, or cut into halves or quarters, or rarely into transverse slices, for the same purpose.

Jalap is imported from Vera Cruz, and the average imports into the United Kingdom may be estimated at about 180,000 lbs.

General Characters and Composition.—When entire, the tubercules are usually irregularly roundish or somewhat ovoid, rarely they are fusiform or even cylindrical; they vary commonly in size from a hazel-nut to that of a hen's egg, but sometimes they are as large as a man's fist, or even larger. The large tubercules are generally marked with the circular or transverse incisions, made as noticed above, to facilitate their drying. Externally they have a dark brown colour, and are more or less deeply furrowed, contorted, and wrinkled, or rarely they are nearly smooth. Internally their colour is dirty yellowish or brownish, and marked frequently with darker brown irregularly concentric rings. They have a faint, peculiar, somewhat nauseous odour, which is increased by rubbing or powdering them; and a nauseous, sweetish, subsequently acrid taste. Good jalap is hard, heavy, plump, and resinous; the light, whitish, amylaceous, shrivelled, or woody pieces, are of inferior quality. The powder of jalap is of a yellowish-grey colour.

The activity of jalap is due to a *resin,* which is official in the British Pharmacopœia and in the Pharmacopœias of India and the United States.. The amount of resin has been variously estimated at from 11 to 21 per cent. Among other constituents of jalap, are *sugar, starch, gum,* and *colouring matter.* From this crude resin which is obtained from jalap by spirit of wine, two resins may be extracted, one which is *soluble in ether,* and which constitutes from 5 to 8 per cent. of its substance, or, according to Umney, 12 per cent.; and another forming the residue, which is *insoluble in ether,* and which has been termed *Convolvulin,* or formerly by Pereira *Jalapin,* but this latter name, as will be presently

mentioned, is now applied to a resin which *is soluble in ether*. Convolvulin is a glucoside, being resolvable by moderate heating with emulsin, or dilute acid, into *sugar*, and a crystallizable substance called *Convolvulinol*. Convolvulin when pure is colourless, and readily dissolves in alcohol or the fixed alkalies; but is insoluble in ether, or ammonia, or in oil of turpentine.

Adulterations and Substitutions.—In consequence of the increased demand for official jalap combined with a falling off in the supply from its original source, jalap has of late years been frequently adulterated by being intermixed with the roots of other plants, but the characters given above of true jalap are such as will readily distinguish it. The roots of two plants which are extensively used as adulterants of, or substitutes for, the official jalap, require, however, some notice from us; these are *Tampico Jalap* and *Woody Jalap*.

1. *Tampico Jalap*, as its name implies, is imported from Tampico, a port to the north of Vera Cruz, in the Gulf of Mexico. Hanbury traced its botanical source to *Ipomœa simulans*. Tampico jalap agrees with true jalap in odour and taste, and pieces may be found which also resemble it in other respects, but it may be generally distinguished from the genuine drug by its more shrivelled appearance, lighter weight, smaller size, and more elongated and tapering form. Tampico jalap yields from 10 to 15 per cent. of a *resin*, which in its pure state is entirely *soluble in ether*. This resin therefore differs from *Convolvulin*, the principal constituent of crude jalap resin, which is *insoluble in ether*. Tampico jalap is generally regarded as inferior in medicinal activity to the official jalap, but we have no very accurate information on this point. It is imported in large quantities into this country and elsewhere.

2. *Woody Jalap* or *Orizaba Root*, or as it is also termed *Light, Fusiform*, or *Male Jalap*, or *Jalap Tops* or *Stalks;* is derived from the neighbourhood of Orizaba, and its botanical source is *Ipomœa orizabensis*, Ledanois. It is generally found in irregular, angular or circular pieces, which are clearly portions of a large root; or sometimes the smaller roots are found entire, and are

then fusiform. It is readily distinguished from true jalap by its paler colour and more woody character; it is also commonly more shrivelled and of lighter weight. Its essential constituent is a *resin*, to which the name of *Jalapin* has been unfortunately given, and which may be obtained from it to the extent of about 12 per cent. When pure Jalapin is colourless, amorphous, translucent, and *perfectly soluble in ether*, by which it differs from *Convolvulin*. It is regarded by chemists as identical with scammony resin, and hence, probably this kind of jalap is but little, if at all inferior, as a medicinal agent, to that of true jalap.

Medical Properties and Uses.—Jalap is a certain, powerful, and speedy drastic purgative, causing copious watery stools. It is less irritant than gamboge, podophyllum, or even scammony; but it occasionally causes griping, aud sometimes nausea and vomiting. It is frequently given to children as a vermifuge, on account of its little taste, and generally safe action. It is a valuable purgative in habitual constipation, and in febrile and inflammatory affections, especially when combined with aromatics which diminish the griping; it is also given as a hydragogue in dropsies, as a derivative purgative in head affections, and in other cases.

Per. Mat. Med., vol. ii, pt. 1, p. 614; Per. Mat. Med., by B. & R., p. 634; Pharmacographia, p. 399; U. S. Disp., by W. & B., p. 501; Guibourt, Histoire des Drogues (1869), vol. ii, p. 523, Gmelin's Chem., vol. xvi, pp. 154 & 159; Hanbury, in Journ. Linn. Soc. Bot. (1871), p. 279; Umney, in Pharm. Jl., vol. ix, 2nd ser., p. 282; Evans, in Pharm. Jl., vol. ix, 2nd ser., p. 330; Squibb, in Amer. Journ. of Pharm., Jan., 1868, pp. 65-6; Amer. Journ. of Pharm., vol. ii, p. 22, and vol. x, p. 224; Watts' Dict. Chem. vol. ii, p. 15.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Gardens, Kew, flowering in September.

1. Part of stem, with flowers and leaves.
2. Vertical, and—3. Transverse section of ovary.
4. Stigma.
5. Base of the stem and tubercular roots.

D.Blair ad nat del. et lith.

M.&N.Hanhart imp.

CONVOLVULUS SCAMMONIA, *Linn.*

N. Ord. Convolvulaceæ.

Tribe *Convolvuleæ*.

Genus Convolvulus,* *Linn.* B. & H., Gen., ii, p. 874. Species about 150, natives of the temperate regions of both hemispheres, especially of Asia Minor.

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187. Convolvulus Scammonia,† *Linn., Sp. Plant., ed.* 1, *p.* 153 (1753).

Scammony.

Syn.—C. pseudo-Scammonia, *C. Koch.*

Figures.—Woodville, t. 86; Steph. & Ch., t. 60; Nees, t. 195; Hayne, xii, t. 35; Berg & Sch., t. 13 c; Flora Græca, t. 192.

Description.—A perennial herb, with a very long, straight, perpendicular, very gradually tapering, cylindrical, unbranched, woody root about ½ to 3 or 4 inches thick, smooth and yellowish outside, paler within and exuding milk when wounded, giving off scattered small root-fibres. Stems numerous, from the crown of the root, elongated, slender, cylindrical, smooth, hollow, twining, copiously branched, branches horizontal, spreading widely. Leaves alternate, scattered, on long petioles without stipules, deltoid-triangular, but varying in width, apex somewhat attenuated, very acute, base straight or more or less cordate, usually with one or two large jagged teeth on each side, the rest of the margin entire, smooth on both sides, punctate below. Flowers large, numerous, on long stalks, either solitary or in small trichotomous cymes, at the extremity of long axillary horizontal peduncles, bracts opposite, small, leaflike. Sepals 5, unequal, glabrous, green, the margins undulated, bordered with brownish-red, the two outer broadly oblong or ovate, the 3 inner longer and narrower, apiculate and toothed at the end. Corolla widely funnel-shaped 1½—2 inches wide at the mouth, very narrow at

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* From *convolvo*, to entwine; a mediæval name for some plants of the genus.

† *Scammonia*, in Greek σκαμμονία, the classical name for the plant.

the base, obscurely 5-lobed, with a faint notch between the divisions, delicate, smooth, pale yellow, slightly greenish at the base within, convolute and twisted in the bud, and marked on the outside of the folds with a pink tapering line. Stamens 5, inserted close to the base of the corolla, small, erect, filaments tapering, covered with small prominences, anthers linear, 2-celled, white. Ovary small, elevated on a thickened gynophore, 2-celled, with 2 ovules in each cell, style very slender, about as long as the stamens, white, stigmas 2, oblong, spreading, papillose. Fruit an ovate-globose capsule about ½ inch long, surrounded by the persistent reddish-brown sepals which it scarcely exceeds, capped by the withered style, pericarp thin, parchment-like, splitting vertically into 4 valves. Seeds 4, somewhat irregular in form, angular, testa dark brown, rough with small prominences; embryo green, cotyledons foliaceous, veined, twice folded on themselves, punctate with scattered pellucid dots, radicle long, slightly curved; endosperm scanty.

Habitat.—A native of the East, and common in waste places in most parts of Asia Minor, Greece, the Crimea, and Syria, but not extending to the western part of the Mediterranean district; the stems spread widely over the bushes which are profusely ornamented with the pretty pale sulphur-coloured flowers about the size of those of the common *C. arvensis* of England. The drug is collected from the wild plant in several parts of Asia Minor and in Syria.

Scammony has long been cultivated in English gardens, and is included in the catalogue of Gerard's garden published in 1596. It flowers in the autumn.

Choisy, in DC. Prod., ix, p. 412; Boiss., Fl. Orient., iv, p. 108; Lindl., Fl. Med., p. 398.

Official Parts and Names.—1. Scammoniæ Radix; the dried root: 2. Scammoniæ Resina; a resin prepared from Scammony Root or Scammony: 3. Scammonium; a gum-resin, obtained by incision from the living root (B. P.). 1. The dried root (*Scammoniæ Radix*): 2. Gum resin (*Scammonium, Scammony*),

obtained by incision from the living root (I. P.). Scammonium; a resinous exudation from the root (U. S. P.).

1. Scammoniæ Radix.—Dried Scammony root was introduced into the British Pharmacopœia in consequence of the extensive adulterations to which the ordinary scammony of commerce was liable; and also, as a means for obtaining the active principle of the drug at a moderate price. This root can scarcely be called a regular article of commerce, although it is sometimes to be met with in somewhat large quantities in the London market; it is, however, frequently collected in Syria and Asia Minor by collectors sent out by private firms for that purpose. The dried roots usually present a more or less twisted appearance; they vary in length from one to two or more feet, and in diameter from one to three or more inches, averaging about one inch. They are nearly cylindrical in form, except towards the crown, which is somewhat enlarged, and usually presents some remains of the slender aërial stems. They are covered by a greyish-brown or yellowish bark, are more or less shrivelled and longitudinally furrowed from contracting in the process of drying; and when fractured, they present a pale brown colour internally, and on the fractured surface the pure inspissated resin may be often seen in the form of irregular fragments of a pale yellowish-brown colour. They have a faint odour and taste, somewhat resembling jalap.

The active constituent of the root is *a resin*, which according to the experiments of Marquart, Flückiger and Hanbury, A. Hess, and others, occurs in the dried root, in proportions varying from about 3·5 to 6·5 per cent. The roots are richest in resin just before the plants flower; at which time, therefore, they should be collected for use in pharmacy. This resin is described below under the head of "Scammoniæ Resina." Amongst the other constituents of the root, are *gum, starch, sugar, tannic acid,* and *extractive*. The starch has been particularly described by Greenish, and he has urged the desirability of distinguishing the granules of scammony starch from those of wheat, which, as will be noticed under "Scammonium," is one of the common adulterants of the ordinary commercial scammony.

2. Scammoniæ Resina.—Scammony resin, or as it is sometimes termed when purified *scammonin*, is directed to be obtained either from scammony root or ordinary commercial scammony. According to Spirgatis, the resins obtained from these two sources are identical in appearance, in composition, in their relations to solvents, and in their reactions; a result which the experiments of Knujse had previously rendered doubtful. According to A. Hess, however, the resin prepared from the root uniformly contains tannic acid, while that prepared from commercial scammony is free from it.

The following are the characters and tests of scammony resin as prepared according to the directions of the British Pharmacopœia:—"In brownish translucent pieces, brittle, resinous in fracture; and if prepared from the root of a sweet fragrant odour. It cannot form singly an emulsion with water, by which it is distinguished from ordinary scammony. Its tincture does not render the fresh cut surface of a potato blue, indicating the absence of guaiacum resin." Ether dissolves it entirely, by which it is distinguished from jalap resin. It is also entirely soluble in alcohol. In a pure state scammony resin is colourless; and is identical with the resin called *Jalapin*, which is found in the root of *Ipomœa Orizabensis*, and has been described under the head of Woody Jalap or Orizaba Root, in our article on Exogonium purga.

3. Scammonium.—*Collection, Preparation, and Commerce.* Scammonium or Scammony is collected during the summer months, when the plant is in flower, as follows:—The peasant first clears away the bushes which shelter the plant, and after removing the earth from the root to the depth of from three to five inches, he then cuts through it in a slanting direction with a sickle-shaped knife, at from 2 to 4 inches below the crown; and a mussel-shell is immediately stuck into the root just beneath the lower part of the cut portion in order to receive the sap or milky juice which immediately flows out; this pure scammony when dry is a transparent gummy-looking substance of a golden-yellow colour. The quantity afforded by a single root varies very much according to its age, size, and locality; the

average quantity would appear to be about sixty grains. The shells are usually left till the evening, when they are collected, and the cut part of the root is also scraped with a knife to remove the dry or partially dry tears of scammony which adhere to it. The contents of the shells which are softer than the portions scraped from the roots, are called by the Smyrna peasants, *gala* or milk, and the latter *kaimak* or cream. Some of the scammony is generally allowed to dry in the shells, and is kept for use by the peasants; but scammony in shells is not met with in commerce.

Commercial scammony is obtained by the peasants emptying the contents of the shells and the portions scraped from the roots into a copper pot or leathern bag, which is carried home, and then the whole is incorporated with a knife into a homogeneous mass, which is at once allowed to dry. In this state the scammony is of the finest quality; but such scammony is very rarely met with; for usually the peasant, instead of drying off the scammony directly, allows his daily gatherings to accumulate until he has obtained a pound or more; he then softens it by exposure to sunshine, after which it is kneaded, either by itself, or by the addition of a little water, into a plastic mass, and finally dried. This constitutes the ordinary fine scammony of commerce known as *Virgin Scammony*. Scammony thus prepared, although containing no foreign substances, is not so good as that dried off as it is collected, for by its long retention in a semi-liquid state and exposure to heat, it undergoes fermentation, and acquires a dark colour and a strong cheesy odour; and when dried it has a porous or bubbly structure. These latter characters are not to be found in the scammony allowed to dry in the shell, or in that which is collected from the shells, &c., and dried off at once. Pure scammony is very liable to become mouldy, and also, after some time, to be covered with a white crystalline efflorescence; but such changes do not occur if the scammony is kept quite dry.

Scammony is very much adulterated; commonly by the peasants themselves before it is brought to the market; but also

by the dealers who purchase it for that purpose of the peasants in a half-dried state. The substances most frequently used as adulterants are carbonate of lime and wheat-flour; but wood-ashes, sand, gum, tragacanth, powdered scammony roots, common resin, gypsum, black-lead, and other substances are also employed for the purpose.

Scammony is chiefly exported from Smyrna, and from the province of Aleppo, although in the consular returns of the Aleppo market for 1875, scammony does not appear at all. In former times Aleppo Scammony was regarded as the best kind; but Smyrna Scammony is now much preferred to it, and is therefore of higher commercial value. Scammony is generally shipped in small cases containing about thirty pounds each.

General Characters and Composition.—The best kind of scammony—namely, that which is simply the pure juice dried as soon as it is collected—is in more or less flattened or amorphous pieces, of from about half an inch to an inch in thickness. In mass it has a somewhat chestnut-brown colour, but when reduced to small fragments, these are of a pale yellowish- or somewhat reddish-brown colour, and transparent. The pieces are very brittle, and when broken the fractured surface presents a shining vitreous appearance, and has but few or no air cavities. It yields from 88 to 90 per cent., or more, of resin. Scammony of this quality is, however, but rarely met with, the ordinary best commercial scammony being that which we have already noticed under the name of Virgin Scammony, the characters of which are as follows:—In flattish cakes or amorphous pieces, of an ash-grey or somewhat blackish colour externally, and sometimes covered with a greyish-white powder from the lumps rubbing against each other. It is very brittle, and is readily reduced to fragments by the pressure of the nail, or between the fingers. Its powder is of an ash-grey colour, and when triturated with water it forms a smooth emulsion; and the cooled decoction is not rendered blue by solution of iodine, indicating the absence of starchy substances. Its fresh fractured surface is resinous, shining, of a uniform dark greyish-black

colour, and usually of a more or less porous, and somewhat bubbly appearance; when rubbed with the moistened finger it readily forms a whitish emulsion, by which it is distinguished from scammony resin; and when touched with hydrochloric acid it does not effervesce, indicating the absence of chalk. Thin fragments when viewed by transmitted light are translucent, and of a greyish- or yellowish-brown colour. It has a peculiar odour, resembling that of old cheese; and when chewed it has very little taste at first, but it causes afterwards a slight prickly sensation in the back of the throat. Ether removes from 80 to 90 per cent. of resin, and what remains is chiefly soluble gum, with a little moisture.

Medical Properties and Uses.—The effects of both ordinary scammony and resin of scammony are those of a certain and powerful drastic cathartic, closely resembling jalap, but somewhat more irritant and active. Scammony usually causes much watery discharge, and frequently griping; it is generally given in conjunction with other purgatives. On account of its irritant qualities it is contra-indicated in inflammatory conditions of the alimentary canal: but it is particularly well adapted for cases of constipation depending upon torpidity of the bowels. It is also well adapted for children on account of the smallness of the dose required, its little taste, and the safety and certainty of its action; hence in combination with calomel it is a common vermifuge for children. It is also employed as a derivative purgative in cerebral affections and dropsies; and in other cases where an active cathartic is required, when its use is not contra-indicated by its irritant properties. As a purgative the resin is commonly given in somewhat smaller doses than the ordinary scammony of commerce, but when the latter is pure there is scarcely any difference in their effect.

Steph. & Church., Med. Bot., by Burnett, vol. i, pl. 60; Per. Mat. Med., vol. ii, pt. 1, p. 600; Per. Mat. Med., by B. & R., p. 626; Pharmacographia, p. 394; U. S. Disp., by W. & B., pp. 785 and 1388; Buchner's Neues Repertorium, 1864 (13, No. 10, p. 448); Buchner, in Pharm. Journ., vol. xiv, 1st ser., p. 38; Pharm. Journ., vol. xvii, 1st ser., pp. 37, 447, 451,

and 453; Spirgatis, in Pharm. Journ., vol. v, 3rd ser., p. 65; A. Hess, Archiv der Pharmacie, vol. iii, p. 223, and Pharm. Journ., vol. vi, 3rd ser., p. 122; Maltass, in Pharm. Journ., vol. xiii, 1st ser., p. 264; Boulier, in Pharm. Journ., vol. i, 2nd ser., p. 521; Haselden, in Pharm. Journ., vol. v, 3rd ser., p. 41; Greenish, in Pharm. Journ., vol. v, 3rd ser., p. 263; Proc. Amer. Pharm. Ass. (1875), vol. xxiii, pp. 152–154.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Gardens, Kew, flowering in September; the fruit added from a specimen from Cilicia in the British Museum.

1. Portion of a branch with flowers.
2. The stamens.
3. The pistil.
4. Vertical, and—6. Transverse section of the ovary.
5. Stigmas.
7. Capsules.
8. Seed.
9. Section of the same.
10. Embryo.
11. Cotyledon flattened out.
12. Portion of root of a young plant.

(4–6, 9–11 enlarged.)

M&N Hanhart imp.

Hollick FLS ad nat. del. et lith

CAPSICUM FASTIGIATUM, *Blume*.

N. Ord. SOLANACEÆ. Lindl., Veg. Kingd., p. 618; Le Maout & Dec., p. 575; Milne-Edwards, De la Famille des Solanacées, 1864.

Tribe *Solaneæ*.

Genus Capsicum,* *Linn.* B & H., Gen., ii, p. 892. Species variously estimated, over 50 described, natives of the hot regions of America and (?) the old world.

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188. Capsicum fastigiatum, *Blume, Bijdragen Fl. Nederl. Ind., p.* 705 (1825).

E. Indian Capsicum. Chillies. Bird Pepper. Guinea Pepper.

Syn.—C. minimum, *Roxb.*, non *Mill.* C. frutescens, *Linn.* (*in part*).

Figure.—Wight, Ic. Fl. Ind. Orient., iv, t. 1617.

Description.—A small, spreading shrub about 2 feet high, stem very much branched in a dichotonous or fastigiate manner, the branches flexuose, widely spreading, tetragonous, minutely puberulous. Leaves as in *C. annuum*. Flowers 2 or 3 together in the bifurcations on stiff, slender, erect peduncles, ½—1 inch long, curved at the end. Corolla-segments more acute; the rest as in *C. annuum*. Fruit small, ½—¾ inch long, erect, narrowly ovoid-oblong, cylindrical, bluntly pointed, straight, smooth, glistening, bright orange-scarlet when ripe. Seeds as in the last, but slightly smaller, about ⅛ inch in diameter.

Habitat.—This kind of Capsicum is found in many parts of India, principally in the southern districts, growing in waste places, gardens, &c., in an apparently wild state. It is also found abundantly in Java and other parts of the Eastern Archipelago under similar conditions. There is, however, good reason to believe that in common with the rest of the genus it was originally brought

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* *Capsicum*, καψικόν, is first used by Actuarius, a Greek writer of the 11th or 12th century, who probably intended the same plant as the *Siliquastrum* of Pliny, both names apparently alluding to its small pod; κάψα = *siliqua*. Though these names were referred by the 16th century botanists to the present genus, considerable doubt must remain as to the correctness of the application.

from some part of the American Continent. It is now cultivated to a large extent in the tropics of both the old and new worlds.

Though perhaps originally no more than a cultivated race, *C. fastigiatum* does not present much variation, and may be easily distinguished from *C. annuum* in all its forms by its small, oblong, scarcely conical fruit, in clusters of 2 or 3 on stiff, slender, erect peduncles; the leaves are also somewhat narrower, and the whole habit more slender than in that species.

Dun. in DC. Prod., xiii, pt. 1, p. 416; Nees ab Esenbeck, in Trans. Linn. Soc. Lond., xvii, p. 64; Roxb., Fl. Ind., i, p. 524; Flück. & Hanb., Pharmacogr., p. 406.

Official Part and Names.—Capsici Fructus; the dried ripe fruit (B. P.). The ripe fruit dried (I. P.). Capsicum; the fruit of Capsicum annuum, Capsicum fastigiatum *Blume*, and of other species of Capsicum (U. S. P.).

The general name of Pod Pepper is applied to the fruits of the species and varieties of Capsicum; and two kinds of this Pod Pepper are known in commerce, namely, that derived from the present species, which is alone official in the British Pharmacopœia and the Pharmacopœia of India, and which is distinguished as *Guinea Pepper;* and that obtained from *Capsicum annuum*, which is known more generally in this country under the name of *Capsicums* or *Chillies*, as is noticed in our description of *Capsicum annuum*. Both kinds are official in the Pharmacopœia of the United States under the common name of Capsicum; and are also those termed Cayenne and African Pepper. Both kinds are likewise known in commerce as Chillies; although, as just noticed, this name is more commonly applied in Great Britain to the fruits of *Capsicum annuum*.

General Characters and Commerce.—The dried fruits of *Capsicum fastigiatum*, as seen in commerce, are somewhat compressed and shrivelled; they vary from about half an inch to three quarters of an inch in length, and are a quarter of an inch or less in diameter; they are somewhat conical in form; blunt-pointed; and composed of a smooth, shining, somewhat leathery, thin, translucent,

dry pericarp of a dull orange-red colour, enclosing numerous seeds in the form of small roundish or ovate discs. Both pericarp and seeds have an intensely pungent, fiery taste; and a peculiar pungent odour.

This fruit, when powdered, is the principal source of *Cayenne Pepper*, although this is doubtless also derived, at least to some extent, from *Capsicum annuum* and other species and varieties of *Capsicum*. Cayenne Pepper is sometimes adulterated with red lead and other substances of a like colour. When fresh, however, cayenne pepper has itself a red colour, but by keeping when exposed to light, it becomes brownish yellow. The substance known as *soluble cayenne pepper* is common salt mixed with the oleo-resin referred to below under the name of capsicin, and usually coloured with arnatto.

This kind of Pod Pepper is principally imported from Zanzibar, Sierra Leone, and Natal. It is also exported in large quantities from Bombay, Penang, Pegu, and other districts.

Composition.—The oleo-resinous liquid, commonly known as *capsicin*, and which has been usually regarded as the active principle of the fruit of this and other kinds of Pod Pepper, has, as is noticed under *Capsicum annuum*, been shown to be a complex body by Thresh, who has proved that the real active principle is a crystalline substance, which he has named *capsaicin*. Thresh has also shown that this constituent is intimately associated with a red fatty matter, which is essentially composed of *palmitic acid*.

The term capsicin has also been applied to a volatile alkaloid obtained from capsicum, with the odour of *conia* or *conine*; but although this alkaloid has been also demonstrated by Thresh to exist in very minute proportions in capsicum, he has likewise proved that it is not the active principle of the drug, as it is devoid of pungency. Thresh has also shown that the *capsicol* of Buchheim, although containing the active principle, is not in itself that principle. Thresh could only obtain the real active constituent or *capsaicin* from the pericarp of the fruit and in very minute proportion. Capsaicin melts at 138° and forms a

transparent oily liquid, which solidifies rapidly in cooling, and assumes a crystalline condition; it can be volatilised without suffering decomposition; its specific gravity is 1060; it is readily soluble in alcohol, proof spirit, ether, and the fixed oils, but insoluble in water. Experiments have proved that the physiological action of capsaicin both externally and internally is extremely powerful, so that there can be no doubt of its being the real active principle of capsicum fruit.

Medical Properties and Uses.—When taken internally, capsicum is a powerful stimulant, producing when swallowed in small doses, a sensation of warmth in the stomach, and a general glow over the whole body; hence in moderation it is very useful as a condiment, for which both it and cayenne pepper are very extensively employed, and more especially in tropical countries where vegetable food is chiefly consumed. Taken in this way, it promotes digestion, and prevents flatulence. It is also sometimes given medicinally, as a general stimulant, in atonic dyspepsia, in diarrhœa arising from putrid or undigested matter in the stomach, in extreme prostration, in poisoning by opium, in paralytic affections, and in delirium tremens, in which disease when taken early it is said sometimes to produce sleep. As a remedy for scarlatina, both for internal and external use, it is in great repute in the West Indies. It has also been employed with success on the first approach of nausea in sea-sickness. Locally applied it acts as a rubefacient, and its oleo-resin (*capsicin*) is the active ingredient in Cooper's sinapine tissue. The tincture has been used advantageously in chilblains, but it is a very painful remedy, and not to be recommended. In the form of a gargle capsicum is often very useful in various forms of sore throat, and in hoarseness, depending upon a relaxed condition of the chordæ vocales. John Harley, however, says it is useless in the relaxed form of sore throat; but that in the acute state, when there is pain from dryness of the inflamed membrane, it is clearly useful, as then it excites secretion.

The active principle capsaicin has been tried both internally and externally. As an internal remedy in doses of $\frac{1}{25}$th of a grain, it has been given by Ringer, but it produced such violent pain and

purgative effect, that he was obliged to discontinue its employment. For external use a solution of it in glycerine or weak alcohol has been employed; but it possesses no advantages over the official tincture of capsicum, and is therefore not to be recommended, as from its powerful action its employment requires very great caution.

Per. Mat. Med., vol. ii, pt. 1, p. 594; Pharmacographia, p. 406; U. S. Disp., by W. & B., p. 216; Watts' Dict. Chem., vol. i, p. 747; Royle, Mat. Med., by J. Harley, p. 499; Thresh, in Year Book of Pharmacy for 1876, pp. 250 and 543, and for 1877, pp. 24 and 485; Pharm. Journ., vol. viii, ser. 3, p. 187; Lyons, in Med. Press and Circular, April 18, and June 20, 1866; Amer. Journ. of Pharm., May, 1865, p. 165.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected by Horsfield in the island of Banka.

1. Part of a plant in flower and fruit.
2. A flower.
3. Corolla laid open.
4. Section of calyx and pistil.
5, 6. Seed.
7. Section of the same.

(2–4, 6, 7 enlarged.)

D Blair F L S adnat del et lith

M & N Hanhart

CAPSICUM ANNUUM, *Linn.*

N. Ord. SOLANACEÆ.

Tribe *Solaneæ*.

Genus **Capsicum**, *Linn.*

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189. Capsicum annuum, *Linn., Sp. Plant., ed.* 1, *p.* 188 (1753).

Capsicum. Pod Pepper.

Syn.—C. longum, *DC.* C. grossum, *Willd.* C. cordiforme, *Mill.*

Figures.—Woodville, t. 80; Hayne, x, t. 24; Steph. & Ch., t. 44; Nees, t. 190; Berg & Sch., t. 20 a (*C. longum*); Nees, Gen. Plant. Germ.

Description.—A bushy herb, usually annual, reaching 2 feet or a little more in height. Stem smooth, angular or striate, hollow, dichotomously branched, the branches spreading. Leaves alternate, one coming off from the side of each bifurcation, spreading, on rather long petioles, ovate, 2—3 inches long, acute at both ends, entire, dark geen, thin, glabrous, the upper ones much smaller. Flowers solitary in each bifurcation, on short peduncles, erect, or stiffly curved downwards, thickened at the top. Calyx cup-shaped, truncate, with 5 very small denticulate teeth, persistent, smooth, green. Corolla rotate, with a short tube, the spreading limb cut more than half way down into 5 ovate, acute, faintly ciliate segments, pale greenish-yellow. Stamens 5, inserted on the corolla-tube, short, erect; filaments tapering upwards; anthers about as long as filaments, 2-celled, basifixed, the cells dehiscing longitudinally, purplish-blue. Ovary conical, smooth, 2-celled, with numerous ovules, style rather thick, longer than the stamens; stigma terminal, thickened. Fruit indehiscent, oblong, conoid, ovate or nearly globose, scarcely pulpy, inflated, incompletely 2-celled, skin thin, tough, smooth and very shining, usually brilliant scarlet, often wrinkled. Seeds numerous, compressed, oval or somewhat reniform, nearly smooth, bright yellow; embryo curved into a ring; radicle thick; endosperm scanty.

Habitat.—It is probable that the Capsicum is a native of some part of South America, and that it was consequently unknown in

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Gardens, Kew.

1. A branch with flowers and fruit.
2. Corolla laid open.
3. Calyx and pistil.
4. Vertical section of the same.
5. Transverse section of the ovary.
6. Transverse section of the fruit.
8. A seed.
9. Section of the same.

(2–5, 8–9 enlarged.

D. Blair ad nat del. et lith

M & N Hanhart

SOLANUM DULCAMARA, *Linn.*

N. Ord. SOLANACEÆ.

Tribe *Solaneæ*.

Genus Solanum,* *Linn.* (emend.) Dunal in DC. Prod., xiii (1852), pp. 27—387. One of the largest known genera, containing about 1000 species, for the most part tropical and S. American.

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190. Solanum Dulcamara,† *Linn., Sp. Pl. ed.* 1, *p.* 185 (1753).

Bitter-Sweet. Woody Nightshade.

Syn.—Dulcamara flexuosa, *Moench.*

Figures.—Woodville, t. 85; Steph. & Ch., t. 17; Bigelow, i, t. 18; Hayne, ii, t. 39; Nees, t. 188; Berg & Sch., t. 20 b; Curt., Fl. Lond., fasc. i; Syme, E. Bot., vi, t. 930; Reich., Ic. Germ., xx, t. 1633.

Description.—A climbing shrub, reaching, when supported by other plants, many feet in height. Rootstock woody, widely creeping, irregular, branched, pale yellow. Stem woody at base, dying far back in the winter, much branched, hollow, wood soft, bark greyish yellow; branches flexuose, weak, green, glabrous or pubescent. Leaves alternate, stalked, 2 or 3 inches long; the lower ones ovate, usually cordate at the base, the upper ones hastate or auricled, or even with two nearly separate leaflets at the base, margin entire, usually pubescent beneath. Inflorescence consisting of stalked corymbose cymes of 10—20 flowers, projecting at right angles from one side of the stem, extra-axillary, longer than the leaves; flowers stalked, pedicels slender, tapering downwards, downy or hairy, purple, divaricate, surrounded at the base by a cup-shaped projection of the axis, ebracteate. Calyx small, 5-lobed. Corolla deeply cut into 5 lanceolate acute segments, lurid purple, each with two green spots at the base, spreading or reflexed. Stamens 5, filaments very short, triangular, inserted on

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* The Latin equivalent of the Greek *στρύχνον*, applied to several plants.

† *Dulcis*, sweet, *amarus*, bitter. It was also called by the mediæval botanists *Amara dulcis* and *γλυκύπικρον*—words with the same signification as the English Bitter-sweet.

D. Blair ad viv. del. et lith.

M & N. Hanhart imp.

NICOTIANA TABACUM, L

N. Ord. Solanaceæ.

Tribe *Nicotianeæ*.

Genus Nicotiana,* *Linn.* Dunal, in DC. Prod., xiii, sect. i, pp. 556–572. Species about 60, natives of tropical America, the Pacific Islands, and Australia.

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191. Nicotiana Tabacum,† *Linn., Sp. Plant, ed.* i, *p.* 180 (1753).

Tobacco. Cultivated Tobacco. Virginian Tobacco.

Syn.—Nicotiana macrophylla, *Lehm.* N. auriculata, *Bert.?*

Figures.—Woodville, t. 77; Bigelow, t. 40; Steph. & Ch., t. 37; Nees, t. 194; Hayne, xii, t. 41; Berg. & Sch., t. 12 d; Nees, Gen. Fl. Germ.

Description.—A coarse robust annual, reaching 6 feet high, with a long tapering root. Stem erect, unbranched, cylindrical, solid, green, thickly set with soft viscid hairs. Leaves alternate, numerous, the lower ones very large, reaching as much as 2 feet in length, shortly stalked, ovate-lanceolate or ovate, the upper ones smaller, more or less amplexicaul at the base, rather variable in form, oval-oblong or lanceolate or somewhat obovate, all acute, quite entire, somewhat waved, covered with viscid hairs, and some small sessile glands, bright green, paler beneath, midrib thick, lateral veins curved at the margin. Inflorescence a terminal, rounded or oval panicle, with a few short branches; flowers not numerous, spreading horizontally, shortly stalked; bracts linear. Calyx tubular, somewhat inflated, green, cut half way down into 5 narrow-lanceolate acute segments, viscid-hairy. Corolla 1¾—2 inches long, tubular, the tube inflated in its upper half, smooth within, pale greenish-yellow, finely glandular-hairy outside, the limb spreading, cut into 5 broadly triangular pointed lobes, dull pink or red, plicate in the

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* So called in the 16th century, in honour of Jean Nicot, French ambassador at Lisbon, who in 1560 brought the plant thence into France.

† *Tabacum*, a Latin form of Tobacco, which is said to be originally a native word meaning the pipe or tube used in smoking by the Indians.

bud. Stamens 5, inserted in the base of the corolla, filaments about the length of the tube, one usually shorter than the rest, anthers small, oblong. Ovary smooth, conical, 2-celled, style about as long as stamens, slender, stigma bilobed. Capsule barely an inch long, often shorter, ovate in outline, the lower half closely covered by the dry persistent calyx, pericarp thin, papery, veined, splitting septicidally into 2 valves, which again are partially split from the top, 2-celled, placentas axile, large, spongy. Seeds minute, very numerous, somewhat irregular in form, oblong, ovoid, or sub-reniform, pale brown, the testa marked with a raised reticulation of large pattern with sinuous meshes; embryo slightly curved in axis of endosperm.

Habitat.—There is no doubt that the tobacco is a native of some part of South or Central America, but the precise country of its origin cannot now be determined. Martius considered it introduced in Brazil, and it is nowhere known in a truly wild state.

The plant was first grown in Europe at Lisbon in 1560, the dried leaves and the practice of smoking having been introduced nearly a century before by the Spaniards. In nearly all temperate and warm countries of both hemispheres, the culture of tobacco is now carried on; it grows well in England, into which country it was introduced before 1570, and is now frequently employed as an ornamental plant in gardens, but except in very small quantity it has been, since 1660, illegal to cultivate it for use; the statute then passed for the benefit of the "American Colonies" being still unrepealed. It flowers freely from late summer till the middle of September.

Many varieties are recognised by cultivators, the principal characters being found in the form of the leaves, and colour and size of the flowers. The remarkable *N. fruticosa*, Linn., lately figured (Bot. Mag. 6207) as a variety of the present species, is a very handsome plant, and differs especially in its sharp-pointed capsules: there are good specimens in the British Museum, one from Teneriffe.

Dunal, in DC., l. c., p. 557; Bigelow, Amer. Med. Bot., ii, p. 171;

De Candolle, Géogr. Bot., ii, p. 848; Lindl., Med. Bot., p. 513; Pritzel, Thesaurus Literat. Bot., ed. 1, p. 457.

Official Part and Names.—Tabaci Folia; the dried leaves of Virginian Tobacco (B. P.). The dried leaves (*Tabaci Folia*) (I. P.). Tabacum; the commercial dried leaves (U. S. P.).

Preparation, Kinds of Tobacco, and Commerce.—In America, from which our official tobacco leaves are directed to be obtained, the tobacco harvest takes place in August, when the plants are regarded as ripe. At this period the stems are cut off from the plants just above their roots, and then hung up in the drying houses, where they are exposed to a considerable degree of heat, and during this process of curing, as it is termed, they become moist, or in other words, are said to sweat. They are then further dried and stripped of their leaves; and the latter are then tied in bundles, and packed for exportation, &c. In the process of preparation tobacco leaves appear to undergo a kind of fermentation by which important chemical changes take place in their composition, one of the most evident being the formation of some new volatile principle, for the heavy narcotic odour of the dried leaves is wanting in the fresh ones.

In commerce two states of tobacco are distinguished, in one of which it is termed *unmanufactured* or *leaf tobacco,* in the other *manufactured tobacco.* In the British Pharmacopœia the dried leaves of Virginian tobacco, or unmanufactured tobacco, cultivated in America, are alone official. Under the head of manufactured tobacco are included the different forms of tobacco prepared for chewing and smoking, and for taking as snuff. The description of the numerous forms and varieties of manufactured tobacco does not come within our province.

Besides Virginian tobacco, which is derived, as we have seen, from *Nicotiana Tabacum,* the plant now under notice, other commercial kinds from the same plant are also obtained from the United States of America, as Maryland, Kentucky, &c. By far the greater proportion of unmanufactured tobacco imported into the United Kingdom is from the United States. Professor Thiselton Dyer has also just proved that Latakia Tobacco, which

has hitherto been always supposed to be derived from *N. rustica*, L., is prepared from the flowering panicles and even the capsules of *N. Tabacum*, and that its peculiar flavour is due to being smoked for some months in the smoke of the wood of *Pinus halepensis*. The other principal kinds of tobacco are the Shiraz or Persian from *Nicotiana persica*, Lindl.; East Indian, Manilla, and Turkish, from *N. rustica*, L.; and Cuba and Havannah from *N. repanda*, Willd.

The consumption of tobacco in this country has very much increased of late years. Thus in the year 1841 the quantity of tobacco cleared for home consumption amounted to $8\frac{3}{4}$ oz. per head of population. In 1851 the amount had increased to 1 lb. $0\frac{1}{4}$ oz. per head; in 1861 to 1 lb. $3\frac{1}{2}$ oz.; in 1865 to 1lb. 5 oz.; and in the year 1874 to nearly $1\frac{1}{2}$ lbs. per head of population of the United Kingdom. Thus in the year 1874 no less than 45,253,303 lbs. of unmanufactured tobacco were retained for home consumption, and of manufactured cigars and snuff, 1,280,154 lbs., the whole representing a money value of about £1,600,000; and the duty paid on this amounted to £7,500,000 sterling. The total annual production of tobacco over the whole globe is probably not less than 3,000,000 of tons.

General Characters and Composition.—The characters of leaf tobacco are thus given in the British Pharmacopœia:—Large mottled brown ovate or lanceolate acuminate leaves, bearing numerous short glandular hairs; having a peculiar heavy odour and nauseous bitter acrid taste; yielding when distilled with solution of potash, an alkaline fluid, which has the peculiar odour of nicotia, and precipitates with perchloride of platinum and tincture of galls.

The active principle of tobacco is a volatile alkaloid termed *Nicotia* or *Nicotine*. Virginian tobacco in the dried state contains a varying preparation of nicotia, but probably on an average, about 6 per cent. Nicotia is also generally said to be present in tobacco smoke, but this is denied by Vohl and Eulenberg. Nicotia is a colourless, oily, volatile, inflammable, powerfully alkaline liquid, of sp. gr. 1·048 at 60°, boils at 482°, and has an acrid odour, and a burning taste. It is very soluble in water, the fixed

oils, alcohol, and ether; and by exposure to air and light it quickly assumes a brown colour.

By distillation with water, tobacco leaves yield a concrete volatile oil, which has been termed *Nicotianin* or *Tobacco Camphor*, which is tasteless, crystalline, and with a tobacco-like smell. The other constituents of tobacco leaves are *albumin, resin, gum,* and from 16 to 27 per cent. of *inorganic matters.* As in the process of smoking, the albuminous, resinous, and gummy principles of the leaves, as well as the cellulose of the thick midrib, produce unpleasant products, the manufacturer endeavours to get rid of these by taking out the midrib, and by subsequent preparation to destroy as far as possible these constituents, and cause the development of aromatic ferment-oils.

Medical Properties and Uses.—The alkaloid nicotia is a most energetic poison. As a medicine, tobacco leaf owes its value to its powerfully sedative and antispasmodic properties. In over doses it acts as an acro-narcotic poison. It especially affects the action of the heart; and on account of the dangerous depression sometimes produced by its administration, it is, as a general rule, but little employed as an internal remedy. It has been given, however, in tetanus, dropsical affections, spasmodic asthma, spasmodic colic, retention of urine; and as a means of inducing muscular relaxation, and thus assisting in the reduction of strangulated hernia, and dislocations; but in the latter conditions its use has been now superseded by that of chloroform. Topically, it has been employed in a variety of skin diseases, &c.; and in the form of snuff it has been prescribed as an errhine in head affections, and to arouse the respiratory functions in poisoning by opium and hydrocyanic acid; also in the form of smoke, in asthma, spasmodic coughs, nervous irritability, and sleeplessness. In prescribing tobacco, it should be ascertained whether the patient is in the habit of smoking, snuff-taking, &c., as a dose which might scarcely affect one person, might seriously affect another; for, like opium, a tolerance of tobacco is established by its use.

The enormous consumption of tobacco is, of course, not as a medicine, but in the various modes of smoking, snuffing, and

chewing, which are in common use in nearly every part of the globe. In habitual smokers, the practice, when employed moderately, produces a remarkably soothing and tranquillising effect on the mind, which has made it so much esteemed and employed by all classes of society, and by all nations, civilised and barbarous; and such high authorities as Pereira and Christison say that they are not acquainted with any well-ascertained ill-effects resulting from the habitual practice of smoking in moderation. But when indulged in to "excess, it enfeebles digestion, produces emaciation and general debility, and lays the foundation of serious nervous disorders"; and, according to some practitioners, it also then produces mental affections resembling delirium tremens and insanity.

Per. Mat. Med., vol. ii, pt. 1, p. 569; Pharmacographia, p. 420; U. S. Disp., by W. & B., p. 851; Garr., Mat. Med., p. 330; Royle, Mat. Med., by J. Harley, p. 482; Watts, Dict. Chem., vol. iv, p. 44; Journ. de Pharm., vol. xxii, p. 689; Taylor, in Pharm. Journ., vol. xviii, 1st ser., p. 620; Proc. Amer. Pharm. Assoc., 1858, p. 300, and 1865; Johnston, Chemistry of Common Life, vol. ii, p. 6.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in the Garden of the Apothecaries' Company, Chelsea.

1. Summit of stem with inflorescence.
2. Corolla split open.
3. Capsule with persistent calyx.
4. A seed.
5. Section of the same.

(4, 5 greatly enlarged.)

D. Blanmat del. et lith.

DATUR

M & N Hannart imp

N. Ord. Solanaceæ.

Tribe *Datureæ*.

Genus Datura,* *Linn.* Dunal in DC. Prod., xiii, sect. 1, pp. 538–546. Species 22, natives chiefly of the tropics in either hemisphere.

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192. Datura Stramonium,† *Linn., Sp. Pl., ed.* 1, *p.* 179 (1753).

Thorn-apple. Stramonium.

Figures.—Woodville, t. 74; Hayne, iv, t. 7; Steph. & Ch., t. 6; Nees, t. 193; Bigelow, t. 1 (*D. Tatula*); Berg & Sch., t. 20 d; Curt., Fl. Lond., fasc. 6; Syme, E. B., vi, t. 935.

Description.—A coarse weedy annual, reaching over 3 feet in height. Root tapering, white. Stem erect, green, thick, succulent, nearly solid, cylindrical, dividing at a short distance from the ground into 2 or 3 very spreading branches, which each again dichotomise more than once, the whole forming a large bushy herb. Leaves placed singly on one side of each bifurcation of the stem, the stout, cylindrical, pale green, tapering petiole appearing to continue the branch and the truly axillary buds remaining but little developed, very unequal in size, the lowest and largest often 8 or 9 inches long, ovate, rather flaccid, the margin undulated and deeply indented with large irregular incisions forming unequal spreading teeth, the base unequal, with one side decurrent along the top of the petiole for a short distance, the apex acuminate, nearly or quite smooth, dull green, paler beneath, the young ones slightly

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* *Datura*, a 16th century name, Latinised from the Persian and Arabic names for *D. fastuosa*.

† *Stramonia*, or *Strammonium*, was the name of *Datura Metel*, L., at Venice in the middle of the 16th century, where it was cultivated; and the plant is figured under that title by Tragus and Fuchsius. The origin of the name is not evident, but may perhaps be an Italianised contraction of the Greek στρύκνον μανικὸν used by Dioscorides for *Atropa Belladonna*, and, according to Columna (Phytobasanos, 1592, pp. 46–52), for *D. Stramonium* also, which is beautifully figured (p. 47) by him. *D. Stramonium* seems to have been a later introduction into Europe than *D. Metel*; but as it rapidly spread and became a common plant the name of the latter was transferred to it.

downy. Flowers solitary in the forks (terminal ?), shortly stalked. Calyx 1½inches long or more, pale green, thin, tubular, with 5 short triangular teeth, from each of which a sharp fold or ridge runs down to the base, deciduous, except a small persistent part at the base from which the remainder comes away by a circular fission. Corolla plicate in the bud, tubular-funnel-shaped, 3—4 inches long, and 2 inches wide at the mouth, with 5 plaits and 5 spreading or recurved lobes, with acuminated almost filiform points, white, delicate. Stamens 5, inserted in the corolla-tube and included in it, equal; anthers small, dehiscing longitudinally. Ovary of 2 carpels, pyramidal, 4-lobed, covered with close erect processes, imperfectly 4-celled in the lower part by the outgrowth of a false dissepiment from the dorsal sutures of the carpels to the axile placentas ; style about as long as stamens ; stigma bilateral, blunt. Fruit about 2 inches long, erect, ovoid, rounded-quadrangular in section, surrounded at the base by the enlarged and reflexed persistent base of the calyx, thickly set with unequal sharp rigid spines, nearly completely 4-celled ; pericarp leathery, dehiscing by 4 valves about half way down. Seeds very numerous, closely packed, and flattened horizontally, somewhat kidney-shaped, about $\frac{1}{6}$ inch long ; testa very dark brown, with large shallow pits, and also a minute reticulation ; embryo much curved and surrounded by endosperm.

Habitat.—The Thorn-apple is considered by De Candolle to be originally from the countries bordering the Caspian. It is now spread throughout the world except in the colder temperate and arctic regions, and is especially abundant in Southern Europe. Its introduction into Central Europe does not appear to have taken place before the middle of the 16th century. It is usually found in rich waste ground, or as a garden weed, and is not unfrequent in the south of England under such conditions, but can scarcely be considered naturalised here. In the United States of America it is a familiar weed.

Whether *D. Tatula,* Linn., is to be considered distinct from the present species is undecided, but the differences are very slight, merely consisting of the purple colour of the stems and

outside of the corolla in *D. Tatula*. Other reasons have led some of the best authorities to keep the species distinct, and De Candolle believes *D. Tatula* to be a native of Central America. It occurs more rarely in England than *D. Stramonium* under similar conditions, and seems a more tender plant; it is very common in the south-west of Europe.

Dunal, l. c., p. 540; Syme, E. B., vi, p. 103; Watson, Comp. Cyb. Br., p. 538; Benth, Handb. Br. Fl., p. 330; Bertoloni, Fl. Ital., vi, p. 606; DC., Geogr. Bot., ii, p. 733; Lindl., Fl. Med., p. 510; Pappe, Fl. Med. Capensis Prodr., p. 30.

Official Parts and Names.—1. Stramonii Folia; the dried leaves: 2. Stramonii Semina; the ripe seeds: (B. P.). 1. The leaves: 2. The seeds: (I. P.). 1. Stramonii Folia; the leaves: 2. Stramonii Semen; the seed: (U. S. P.).

1. Stramonii Folia. *Stramonium Leaves.—Collection and General Characters.* The leaves are directed in the British Pharmacopœia to be collected from plants in flower, cultivated in Britain. In the Pharmacopœia of India they are also directed to be collected when the plant is in flower. In the United States the leaves are generally gathered at any time from the appearance of the flowers till the autumnal frost. When collected the entire plants are usually pulled up, the leaves and young shoots are then separated and quickly dried, and finally these are broken up and cut into short pieces, in which condition they are commonly met with.

The fresh leaves have a fœtid, somewhat narcotic odour, which they lose when dried, and then acquire a faint tea-like smell. The taste of both the fresh and dried leaves is bitterish-saline, and disagreeable.

2. Stramonii Semina. *Stramonium Seeds.*—The characters of these seeds are thus given in the British Pharmacopœia:—"Brownish-black, reniform, flat, rough, in taste feebly bitter and mawkish; inodorous unless bruised, when they emit a peculiar heavy smell." A tincture prepared by digesting the entire seeds in spirit of wine presents a greenish fluorescent appearance. The seeds are much more active than the leaves.

3. Substitutes.—Of late years the leaves of *Datura Tatula*,

L. a closely allied species, have been used in this country and elsewhere as a substitute for those of *D. Stramonium,* which they closely resemble in properties; but there is no reliable evidence of their being of greater strength, as has been stated.

In the Pharmacopœia of India the leaves and seeds (*Daturæ Folia et Semina*) of *Datura alba,* L., under the name of Dhatura, are also *official,* like the corresponding parts of *D. Stramonium.* They possess similar properties, and are regarded as of about equal strength.

Datura fastuosa, L. another species, or a variety of *D. alba,* and also common in India, has similar properties to it.

Composition.—The activity of both the leaves and seeds of *D. Stramonium* are due to the highly poisonous alkaloid *daturia* or *daturine;* and although we have no chemical proof of the existence of this alkaloid in the other species of *Datura* alluded to under the head of Substitutes, its presence in them can scarcely be doubted. The leaves however, contain the alkaloid in much smaller proportion than the seeds, and the latter even only yield about $\frac{1}{10}$ per cent. The alkaloid is said to be combined with malic acid. This alkaloid was first described by Geiger and Hesse in 1833, but according to A. von Planta, *daturia* is identical in composition, and possesses the same chemical characteristics as *atropia,* which see under *Atropa Belladonna.* The action of the two alkaloids also resemble each other in their power of dilating the pupil of the eye; but, according to Schroff, atropia has twice the poisonous energy of daturia; while Jobert, again, regards daturia, when applied to the eye, as about three times as powerful as atropia, and more constant and lasting in its operation.

Medical Properties and Uses.—The action of stramonium on the system appears to be the same as that of belladonna, and Garrod says, that he made "many comparative clinical observations on stramonium and belladonna and on stramonium and henbane; he could not, however, distinguish between the action of the three plants when they were administered in corresponding doses." Further observations on the action and uses of stramonium are, however, a desideratum. The properties of stramo-

nium are regarded as anodyne and antispasmodic, and in overdoses it is a powerful poison. It has been found useful in neuralgic and rheumatic affections, in gastrodynia and other painful diseases; and some have regarded it as a very valuable remedy in mania and epilepsy; but in these diseases it not unfrequently produces injurious effects. When used during the paroxysms of spasmodic asthma it commonly gives great temporary relief and facilitates expectoration. In the latter disease, and also in dyspnœa, catarrhs, and in other cases, the leaves are generally smoked like tobacco; or inhalation from their infusion in warm water is resorted to. But its use in these ways requires caution, as it has proved highly injurious and in some instances fatal. In Cochin China a strong decoction of the leaves is regarded as a very efficacious remedy in hydrophobia. In India *Datura alba* is frequently used by the natives for criminal purposes,—the professional poisoners from this drug being called *Dhatureeas*.

In the forms of ointment, extract, plaster, fomentation, &c., the leaves and seeds of the different species of *Datura* have been found useful in allaying pain, &c., when applied to painful tumours, rheumatic enlargements of the joints, nodes, external piles, &c. Locally applied to the eye, stramonium produces dilatation of the pupil, and is therefore applicable in similar cases to belladonna, although, in this country at least, it is generally regarded as inferior.

Per. Mat. Med., vol. ii, pt. 1, p. 562; Pharmacographia, pp. 412–416; U. S. Disp., by W. & B., p. 839; Pharm. of India, p. 174; Garr., Mat. Med., p. 328; Amer. Journ. of Pharm., Sept., 1865, p. 341, and vol. xxviii, p. 38; Jobert, Ann. de Therap., 1863, p. 28.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Botanic Society's Garden, Regent's Park. 1. Portion of plant in flower. 2. The corolla laid open. 3. The ovary and stigma. 4, 5. Transverse sections of very young fruit in the upper and lower portions. 6. Ripe fruit. 7. Transverse section of the same. 8. Seed. 9. Section of the same. (3 enlarged; 8 and 9 much magnified.)

P. Blair ad nat. delt. et lith.

M&N. Hanhart imp.

ATROPA BELLADONNA, *Linn.*

N. Ord. Solanaceæ.

Tribe *Atropeæ*. Miers, Ill. S. Am. Pl., i, App., p. 163, &c. (N. Ord.).

Genus Atropa, *Linn.** Miers, Ill. S. Am. Pl., ii, App., p. 4.
Species 2 or more? natives of South Europe and Asia.

193. Atropa Belladonna,† *Linn., Sp. Pl., ed.* 1, *p.* 181 (1753).

Dwale. Deadly Nightshade. Belladonna.

Figures.—Woodville, t. 82; Hayne, i, t. 43; Steph. & Ch., t. 1; Nees, t. 191; Berg & Sch., t. 20 c; Curt., Fl. Lond., fasc. 5; Syme, E. B., vi, t. 934; Nees, Gen. Fl. Germ, Gamopet.

Description.—A large, bushy, perennial herb, 3—5 feet high. Root large, fleshy, branched, pale brown. Stems thick, cylindrical, smooth, purplish, at first dividing into three, the branches dichotomous, and frequently branching, the youngest shoots pubescent. Leaves numerous, alternate below, in pairs above, one leaf of the pair much larger than the other, all shortly stalked, 3—9 inches long, broadly ovate or oval, tapering into the petiole, acute, perfectly entire, dark green, veiny. Flowers solitary (rarely 2 or 3 together), coming off from between the pairs of leaves, stalked, drooping; peduncle as long or longer than calyx, with short glandular hairs. Calyx deeply 5-cleft, the segments triangular-acuminate, persistent. Corolla bell-shaped, about an inch long, finely downy outside, cut into 5 broad, shallow, blunt, nearly equal, spreading or slightly recurved lobes, dull reddish-purple, tinged with pale green below. Stamens 5, inserted on the base of the corolla and shorter than it, nearly equal; filaments curved upwards at the end; anthers small, roundish, yellowish-white. Style slightly exserted; stigma capitate, green. Fruit a fleshy berry, sub-globular, depressed, umbilicate at the summit, very obscurely 2-lobed, about ¾ of an

* Named from Atropos, one of the three Fates, who was fabled to cut the thread of life. (See Linnæus, Hortus Cliffortianus, p. 57.)

† *Belladonna* is stated by Matthiolus and other mediæval botanists to have been the name of this plant in Venice, where it was employed as a cosmetic.

inch in diameter, deep purple-black, smooth, shining, surrounded at base by the enlarged persistent calyx, 2-celled, fruit-stalk erect. Seeds numerous, crowded, lightly attached to the axile placentas, rounded or oval or faintly kidney-shaped, about $\frac{1}{16}$ of an inch in diameter, minutely pitted and reticulated; embryo curved on itself in the endosperm.

Habitat.—This plant grows in waste ground and stony bushy places throughout Central and Southern Europe (not reaching farther north than Denmark), South-West Asia, and Algeria. In England it is found chiefly on chalk and limestone, from Westmoreland southwards, and though abundant in places, it is a local species and perhaps less common now than formerly; from being frequently found near ruins it has been by some writers considered to be introduced to this country. It is cultivated for medicinal use in a few places in France, England, and North America, and has become semi-wild in the latter country. Belladonna is quite unlike any other plant, and the confusion so often made between it and *Solanum Dulcamara* can only be due to both having been called Nightshade. The fruit of Belladonna is about the size, and has somewhat the appearance, of a black cherry, with a slightly sweet taste. The seeds are readily recognisable under a lens from those of other solanaceous plants, and have been not inaptly compared to miniature Sultana raisins.

Dunal, l. c., p. 464; Syme, E. B., vi, p. 100; Hook. f., Stud. Fl., p. 257; Wats., Comp. Cyb. Br., p. 252; Grenier & God., Fl. France, ii, p. 545; Lindley, Fl. Med., p. 509.

Official Parts and Names.—1. Belladonnæ Folia; the fresh leaves, with the branches to which they are attached; also the leaves separated from the branches and carefully dried; gathered from wild or cultivated British plants when the fruit has begun to form: 2. Belladonnæ Radix; the dried root, cultivated in Britain or imported from Germany: 3. Atropia; an alkaloid obtained from Belladonna: (B. P.). 1. The leaves (*Belladonnæ Folia*), gathered when the fruit has begun to form: 2. The dried

root (*Belladonnæ Radix*): (I. P.). 1. Belladonnæ Folia; the leaves: 2. Belladonnæ Radix; the root from plants more than two years old: (U. S. P.).

1. Belladonnæ Folia. *Belladonna Leaves.—Collection and General Characters.* The leaves should be collected, as mentioned in the British Pharmacopœia, when the fruit has begun to form, as they are then in the greatest perfection, for the reasons stated under the head of Collection in *Digitalis purpurea.* The leaves of the wild plant are commonly preferred; but there does not appear to be sufficient reason for this opinion, and Lefort found from the examination of leaves from both wild and cultivated plants, obtained in the neighbourhood of Paris, that they yielded about the same percentage of their active alkaloid.

The fresh leaves and young shoots when bruised, exhale a somewhat fœtid odour, and the expressed juice dropped into the eye dilates the pupil. They have a feeble, bitterish, somewhat acrid taste. According to Squire, 100 lbs. of fresh leaves yield 16 lbs. of dried. The dried leaves have a brownish-green colour above, and are greyish beneath. An infusion dropped into the eye dilates the pupil. They are thin and friable, without any marked odour, but with a disagreeable, faintly bitter, and slightly acrid taste. Belladonna leaves owe their activity entirely to *atropia* (see *Atropia*). In the British and Indian pharmacopœias the fresh leaves with the branches to which they are attached, are directed to be used in the preparation of the extract of Belladonna. The reasons for thus using the branches with the leaves, will be described under *Hyoscyamus niger.*

2. Belladonnæ Radix. *Belladonna Root.—Collection and General Characters.* The root should be collected for drying in the autumn or early spring, and from plants from about two to four years old. It is usually imported from Germany; but if obtained in a fresh state from cultivated plants, and carefully dried, it is more to be depended upon; and roots about the thickness of the middle finger are to be preferred to those of larger size.

The dried root occurs in commerce in rough, irregular, branched

pieces, of from one to two feet long, and from half an inch to two or more inches thick. It has a dirty greyish or brownish-white colour externally, and is whitish internally; it breaks with a short fracture. It has a very faint, earthy, somewhat sickly odour, and a feeble sweetish taste. An infusion dropped into the eye dilates the pupil. Belladonna root owes its activity, like the leaves, entirely to the alkaloid *atropia*, but this is present in the root in much larger proportion (see *Atropia*).

An uncrystallizable alkaloid, called *belladonnine*, has also been indicated by Hübschmann as a constituent of belladonna root, but of this little is known. The herb also contains *asparagine*, and Attfield obtained from the extract of the leaves both *nitrate* and *chloride of potassium*, and some other substances.

3. Atropia or Atropine.—As already stated, it is to the presence of this alkaloid that the leaves, root, and herb generally, of belladonna, owe their active properties. We have also noticed when treating of Datura Stramonium, that the alkaloid *daturia* is said to be identical in composition, and to possess the same characters and properties, as *atropia*. Atropia is however, contained in by far the larger proportion in the root, which is exclusively used in order to obtain it, and as the alkaloid is principally contained in the bark, the moderately young and small roots yield more atropia than the old and thick roots. According to Brandes, two pounds of the root should yield about forty grains of atropia. It is found in combination with malic acid. Atropia occurs in colourless acicular prisms, sparingly soluble in water, and freely soluble in alcohol, ether, and chloroform; its solution in water has an alkaline reaction, gives a citron-yellow precipitate with terchloride of gold, and has a bitter taste. Atropia leaves no ash when burned with free access of air; powerfully dilates the pupil of the eye; and is a very active poison.

Medical Properties and Uses.—The action of belladonna leaves and root, as already stated under the head of *Datura Stramonium*, appears to be exactly the same as stramonium. Belladonna is regarded as anodyne, sedative, antispasmodic, diuretic, and lactifuge; and like stramonium and some other plants of the natural

order to which it belongs, it dilates the pupil of the eye, whether taken internally, or applied locally. In large doses, belladonna is a powerful poison. It has been used internally in a great variety of diseases, as chorea, epilepsy, hooping-cough, asthma, &c.; also to allay pain and spasm in various forms of neuralgia, rheumatism, gastrodynia, spasmodic stricture of the urethra, colic, tetanus, delirium tremens, dysmenorrhœa and other painful uterine affections; also to check incontinence of urine in children, &c.; as an antidote in poisoning by opium, hydrocyanic acid, or the calabar bean; and in diabetes, pneumonia, acute nephritis, chronic albuminuria, exophthalmic goitre, and numerous other affections. Dr. John Harley also regards it as a most valuable remedy in scarlatina. It has also been considered as a prophylactic against scarlatina, more especially by homœopathic practitioners, but the more general experience of physicians is entirely opposed to this idea.

Atropia is but little used for internal administration on account of its very powerful action. Both it and the sulphate of atropia in solution may be, however, employed for subcutaneous injection. The solution of sulphate of atropia is frequently used in this way, in the collapse of cholera, and in that of digitalis, colchicum, and aconite poisoning, &c.; and also by ophthalmic surgeons for dilating the pupil of the eye.

Both belladonna and atropia are likewise valuable applications to give relief in various neuralgic, rheumatic, and other painful affections, as angina pectoris and palpitation of the heart. Belladonna when applied to the female breast checks the secretion of milk; and Dr. Ringer has found it very useful in checking sweating, as that of the head in rickets; and he also found that the hypodermic injection of $\frac{1}{200}$ gr. of atropia arrested sweating for a whole night in a case of phthisis. The local application of belladonna also moderates inflammatory action, and has thus been found to check suppuration in carbuncles, &c. Belladonna and atropia are also of great value to the ophthalmic surgeon to produce dilatation of the pupil of the eye for ophthalmoscopic examination; and in cataract and other eye affections where it is desirable to dilate the pupil, or

to keep the edge of the iris free, and also to diminish the morbid sensibility of this organ to the influence of light.

Per. Mat. Med., by B. & R., p. 602; Pharmacographia, pp. 409 and 411; U. S. Disp., by W. & B., p. 169; Garr. Mat. Med., p. 324; Royle's Mat. Med., by J. Harley, p. 493. Amer. Journ. of Pharm., vol. xiii, p. 127, and vol. xxxiv, p. 126; Attfield, in Pharm. Journ., vol. iii, 2 ser., p. 448; Squire, in Pharm. Journ., vol. iii, 2 ser., pp. 300 and 368; Bentley, in Pharm. Journ., vol. i, 2 ser., p. 515, and vol. iii, p. 475; Lefort, in Journ. de Pharm., vol. xv (1872), pp. 269 and 341; Dr. T. T. Smith, in Lancet (1874).

DESCRIPTION OF PLATE.

Drawn from a plant in the Royal Botanic Society's Garden, Regent's Park.

1. Reduced sketch of the rootstock and a flowering stem.
2. A branch with flowers.
3. Corolla laid open, and pistil.
4. Vertical, and—5. Transverse section of ovary.
6. Fruit.
7. Transverse section of the same.
8. Seed.
9. Section of the same.

(3–5 enlarged; 8, 9 greatly magnified.)

M&N Hanhart imp

HYOSCYAMUS NIGER, *Linn.*

N. Ord. Solanaceæ.

Tribe *Hyoscyameæ*.

Genus **Hyoscyamus**,* *Linn.* B. & H., Gen., ii, p. 903. Species about 10, natives of the warmer extratropical regions of Europe, Asia, and Africa.

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194. Hyoscyamus niger, *Linn., Sp. Plant., ed.* 1, *p.* 179 (1753).

Henbane.

Syn.—H. agrestis, *Kit.* H. pallidus, *Kit.*

Figures.—Woodville, t. 76; Hayne, i, t. 28; Bigelow, i, t. 17; Steph. and Ch., t. 9; Berg & Sch., t. 16 f; Syme, E., Bot., vi, t. 936; Nees, Gen. Fl. Germ.

Description.—An annual or biennial herb, 1—2½ feet high, with a large tap-shaped wrinkled root, brown outside and white within, and an erect, branched, thick, stiff, cylindrical, pale green stem, covered with long, clammy, jointed, glandular hairs. Root-leaves large, 6—8 inches long or more, stalked, spreading in a rosette, triangular-ovate with an undulated sinuate margin, stem-leaves much smaller, passing into bracts, alternate, sessile and somewhat amplexicaul, ovate-oblong, acute, with large undulated, spreading laciniæ; all thin, pale green, flaccid, slightly hairy above, more conspicuously below, and the veins covered also with long, viscid-glandular hairs. Flowers numerous, sessile or shortly stalked, solitary in the axils of the large, leafy, spreading bracts, crowded, the whole forming a two-ranked, unilateral, scorpioid spike or raceme, which elongates and straightens out after flowering. Calyx large, bell-shaped, with an ovoid tube and a broadly-funnel-shaped, spreading limb, with 5 shallow, equal, broadly-triangular acute teeth, covered with long, clammy hairs, persistent. Corolla 1—1¼ inch wide, the tube funnel-shaped, the limb spreading, and divided into 5 rounded, blunt, shallow, rather unequal lobes, imbricated in the bud, straw-coloured elegantly net-veined with purple and with a purple throat. Stamens 5, inserted near

* *Hyoscyamus*, in Greek ὑοσκύαμος, literally hog-bean, the classical name.

the base of the corolla-tube, but adherent to it for half way up and there slightly hairy, filaments slender, shorter than the corolla but somewhat exserted, anthers dorsifixed, purple, dehiscing longitudinally. Ovary about as long as, and inclosed in the tube of the calyx, smooth, 2-celled, with a thin partition and large axile placentas; style a little exceeding the stamens. Fruit a capsule, enclosed in the globular tube of the enlarged persistent calyx, now an inch long, tough, coriaceous, and with prominent, stiff veins; pericarp smooth, gibbous at the base, the portion in contact with the calyx-tube membranous and semi-transparent, the top hard and rigid, forming a cap or lid, along the lower edge of which dehiscence takes place, 2-celled. Seeds very numerous, closely packed on the large, spongy placentas, roundish-oval in outline, about $\frac{1}{18}$ inch wide, hollowed slightly on each side, brown, marked with fine but conspicuous, prominent reticulations; embryo much curved in the endosperm.

Habitat.—A native of this country, and not uncommon in sandy ground, the borders of commons, waste places, and the sea-coast; in some parts abundant; scarcely native in Scotland. It is found throughout Europe except the extreme north, and is very common in the Mediterranean regions and Western Asia, extending to India and Siberia. In America it is an old introduction. For medicinal purposes it is cultivated in Surrey, Herts, Bedfordshire, and Cambridgeshire; the biennial plant which produces merely a large tuft of spreading radical leaves in the autumn of the first year, being preferred. A variety without the purple veins in the corolla, which is thus entirely of a pale yellow colour, has been named *H. pallidus*, Kit. *H. agrestis*, Kit, is the small, annual form.

Dunal, l. c., p. 546; Syme, E., Bot., vi, 106; Hook. f., Stud. Fl., p. 255; Wats., Comp. Cyb. Br., p. 251; Gren. & Godr., Fl. France, ii, 546; Ledebour, Fl. Ross, iii, p. 192; Lindl., Fl. Med., p. 508.

Official Parts and Names.—Hyoscyami Folia; the fresh leaves with the branches to which they are attached; also the leaves separated from the branches and carefully dried; gathered from

wild or cultivated British biennial plants when about two thirds of the flowers are expanded (B. P.). The dried leaves (*Hyoscyami Folia*), collected when about two thirds of the flowers are expanded (I. P.). 1. Hyoscyami Folia; the leaves: 2. Hyoscyami Semen; the seed (U. S. P.).

1. Hyoscyami Folia. *Hyoscyamus Leaves. Henbane Leaves.*—*Collection.* The advantage of collecting the leaves of plants after the partial expansion of their flowers has been already noticed under the head of *Digitalis purpurea.* But the reason why the young branches should be gathered with the leaves, as also directed in the British Pharmacopœia, has still to be explained. It has been described by one of us in the *Pharmaceutical Journal,* as follows:—Thus after showing the action of the leaves in the formation of the products and secretions of plants, it is stated "that without leaves or other organs of an analogous nature, no growth to any extent can take place, or any secretions be formed in the plant. Thus the floral leaves and the green parts of the flower have a similar effect to the leaves; even the young herbaceous parts, from which the leaves and other organs arise, are also directly concerned in the formation of products and secretions. This assimilating power of the young green herbaceous parts is commonly lost sight of, but in reality the structure of these parts is essentially the same as the leaves, except that their tissues are somewhat more compact and differently arranged; hence, in proportion to amount of matter, they do not expose so large a surface to the action of air and light as the leaves, and as the process of assimilation only takes place in the cells immediately below the epidermis, their powers of forming products and secretions are somewhat less intense; but the difference between the parts immediately in contact with the leaves and the leaves themselves must be very slight. Indeed, it is by no means certain but that the young herbaceous parts frequently contain quite as much, or even more, active secretions than the leaves themselves; thus, if the latter organs be left on the stem till they have passed their active vital condition, the active secretions which they normally contain, will have passed to a great degree into the

young branches, and hence they would then be probably more active than the leaves, as they would in such cases be not only assimilating organs, but also the receptacles for the products and secretions formed in the surrounding parts. Hence, in practice, in making preparations from herbaceous plants, we may consider the young vitally active parts in immediate contact with the leaves, as not materially differing in activity from them, and that consequently they may be advantageously as well as economically used with them." Although the above description is necessarily somewhat long, we have given it in full, because it is not only applicable in the collection of Hyoscyamus leaves, but also to those of several other plants noticed in this work.

One hundred pounds of the fresh herb yield about fourteen pounds when dried. The leaves of the biennial variety of henbane gathered in the second year, at the time directed in the British Pharmacopœia, are regarded as the most active, and are alone official in this country. But experiments upon the relative merits of the annual and biennial varieties of Henbane are still a desideratum.

General Characters.—The characters of the second year's leaves, &c., are given in the British Pharmacopœia as follows :— "Leaves sinuated, clammy, and hairy. The fresh herb has a strong unpleasant odour, and a slightly acrid taste, which nearly disappear on drying. The fresh juice dropped into the eye dilates the pupil." In a dried state, henbane is sold in three conditions. 1. The foliage and green tops of the Annual plant ; 2. the leaves of the first year's Biennial plant ; and 3. the foliage and green tops of the Biennial plant.

2. Hyoscyami Semen. *Hyoscyamus Seed. Henbane Seed.*— Henbane seeds are official as well as the leaves in the United States Pharmacopœia, but the latter are nevertheless alone ordered in the preparations of that volume. Everywhere the leaves are more commonly employed, and are most esteemed. Hyoscyamus seeds are small, somewhat compressed, roundish, finely reticulated, of a brownish colour, an oleaginous bitter taste, and with the same odour as the plant.

3. Substitutes.—In the south of Europe, *Hyoscyamus albus*, a native of the region of the Mediterranean, and so-called from the pale colour of its flowers, is used as the official henbane, and is regarded as equal to it in medicinal value. Stocks has also described a very virulent species of *Hyoscyamus* under the name of *H. insanus*, a common plant of Beluchistan, and called Mountain Hemp, and which, he states, is sometimes used for smoking, and also for criminal purposes; it would be desirable to have further particulars of this plant.

Composition of Hyoscyamus Leaves and Seeds.—The most important constituent of hyoscyamus is *hyoscyamia* or *hyoscyamine*, an alkaloid which has been obtained both from the leaves and seeds, but it exists in the largest proportion in the latter, but even these only yield of it, according to Höhn and Reichardt, about 0·05 per cent. The leaves, as first shown by Attfield, also contain nitrate of potassium; and according to Thorey, this salt, and the alkaloid hyoscyamia, are largest in amount before the process of flowering.

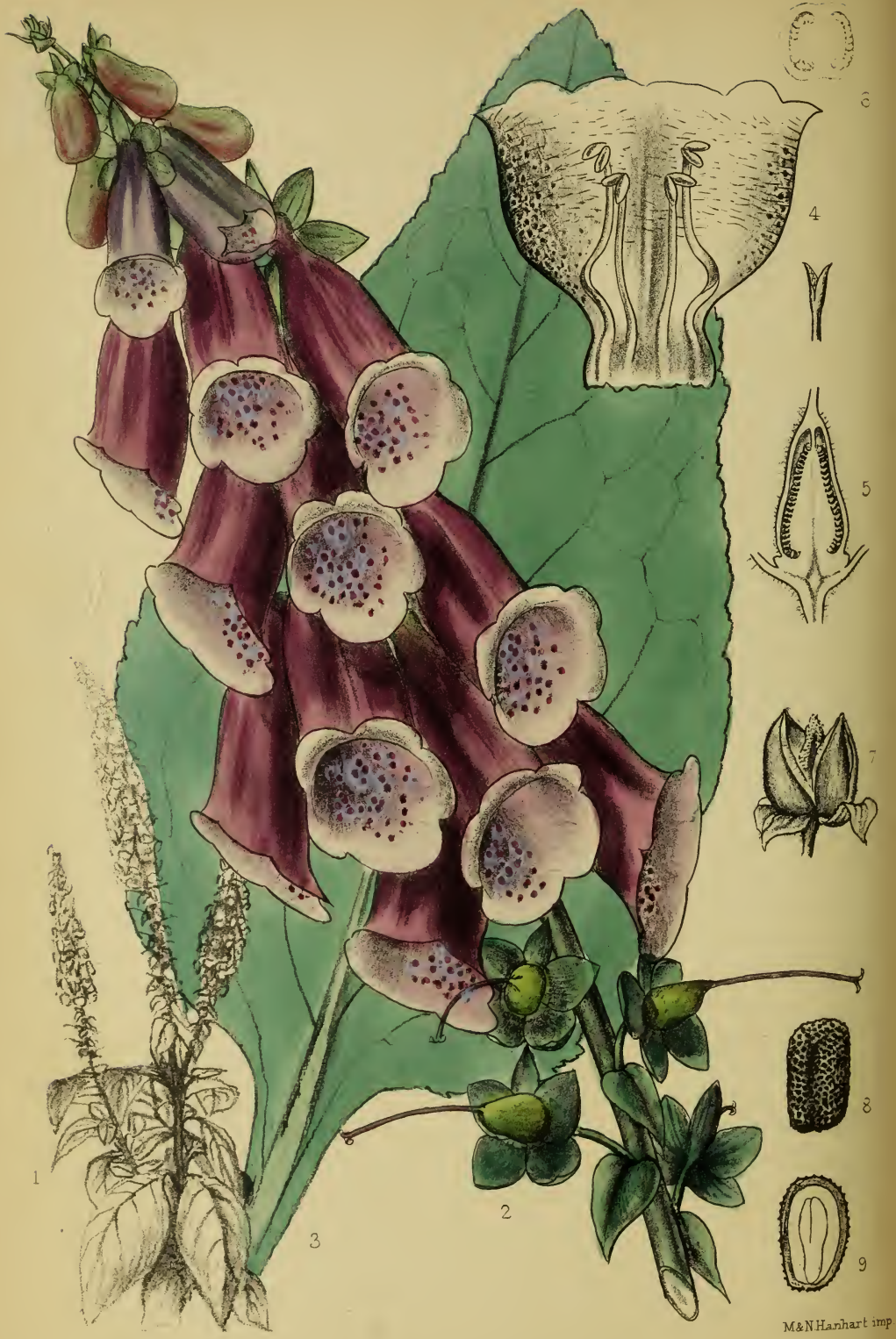
Medical Properties and Uses.—Dr. John Harley, who has made observations on the action of hyoscyamus, says, "Henbane, like belladonna, produces dilatation of the pupil, somnolency, a parched condition of the tongue and mouth, and in sufficient doses delirium. The general action of henbane on the secretions and nervous system agree in all respects with that of belladonna, and the result of its action is the same, but the influence of henbane on the cerebrum and motor centres is somewhat greater, while its stimulant action on the sympathetic is less. Both drugs directly stimulate the heart, but after moderate doses the action of henbane results in a sedative effect. Small doses of henbane are sedative and tonic to the heart; large doses excite it, and excessive doses depress it almost as readily as those of belladonna. Both drugs produce relaxation of the voluntary muscles and of the occluding fibres of the intestine and bladder." Hence, he regards henbane as a valuable remedy in cardiac and pulmonary asthma; in excited cardiac action from valvular disease; as an anodyne in renal colic, and numerous other affections; as a

useful remedy in spasmodic affections of the uterus, bladder, urethra, &c.; and in hypochondriasis and emotional epilepsy, &c. The use of henbane is contra-indicated in convulsive and cerebral diseases generally; and old and feeble persons are frequently unpleasantly affected by henbane. It may be frequently given as a substitute for opium, where the administration of the latter is objectionable, as it does not cause constipation and sickness like it. In India henbane seeds are prescribed by the Mahomedan doctors "to soothe the mind, procure sleep, and keep the bowels gently open in cases of melancholia and mania." Garrod has demonstrated that hyoscyamus should not be given in combination with free potash or soda, which render it perfectly inert; but according to Dr. John Harley, the action of these substances on henbane is so slow that a dose of henbane is not impaired by taking it with one of a caustic alkali. Locally applied, henbane may prove valuable in certain diseases of the eye from the power it possesses of dilating the pupil; and as an external application it may be employed in various neuralgic and other painful and irritable affections.

Per. Mat. Med., vol. ii, pt. 1, p. 539; Pharmacographia, p. 416; U. S. Disp., by W. & B., p. 471; Royle's Mat. Med., by J. Harley, p. 485; Garr., Mat. Med., p. 329; Pharmacopœia of India, p. 180; Pharm. Journ., vol. i, 1st ser., p. 406; Lancet, May 8th, 1841; Bentley, in Pharm. Jour., 2nd ser., vol. 3, p. 475; Usher, in Pharm. Journ., 2nd ser., vol. ix, p. 85; Tilden, in Pharm. Journ., 2nd ser., vol. viii, p. 127; Attfield, in Pharm. Journ., vol. iii, 2nd ser., p. 447; Stocks, in Hooker's Journ. Bot., vol. iv, p. 178; Garrod, in Pharm. Journ., 1st ser., vol. xvii, p. 462, and vol. xviii, p. 174; Med. Times and Gaz., April, 1868, p. 876.

DESCRIPTION OF PLATE.

Drawn from a plant in the Garden of the Apothecaries' Company, Chelsea; the root-leaf added from a wild specimen from Devonshire. 1. A flowering branch. 2. The same, in fruit below. 3. A root-leaf. 4. Corolla cut open. 5. Vertical section of calyx and ovary. 6. Transverse section of ovary. 7. Ripe fruiting calyx. 8. Capsule. 9. Vertical section of the same. 10. Seed. 11. Section of the same. (2 reduced. 10, 11 much magnified.)



D.Blair ad nat del et lith.

M&N Hanhart imp

DIGITALIS PURPUREA, *Linn.*

N. Ord. SCROPHULARIACEÆ. Lindl., Veg. Kingd., p. 681; Le Maout & Dec., p. 583.

Tribe *Digitaleæ*.

Genus **Digitalis**,* *Linn.* Lindley, Monogr., Gen. Digit. (1822); Benth. in DC. Prod., x, pp. 449—453. Species about 18 or 20, natives of Europe and Central Asia.

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195. Digitalis purpurea, *Linn., Sp. Pl. ed.* 1, *p.* 621 (1753).

Foxglove.

Syn.—D. tomentosa, *Link & Hoffm.*

Figures.—Woodv., t. 78; Steph. & Ch., t. 18; Hayne, i, t. 45; Nees, t. 154; Berg & Sch., t. 21 b; Curt., Fl. Lond., fasc. i; Syme, E. Bot., t. 952; Reich. Ic. Germ., xx, t. 1688; Lindl., Monogr., t. 2.

Description.—A tall herbaceous biennial (or perennial?). Root of numerous long thick fibres. Stem upright, from 2 to 7 or more feet high, solitary or several, simple or slightly branched; branches erect, round, closely downy. Radical leaves very large, often a foot or more long, contracted at the base into a long, winged petiole, ovate, subacute, irregularly crenate-dentate, somewhat rugose, slightly hairy and dull green above, densely pubescent and grey beneath; the upper ones becoming gradually narrower and more shortly stalked, and at length passing into the sessile bracts. Inflorescence a much elongated terminal raceme, the pedicels spreading, and, like the rachis, closely pubescent; flowers large, numerous (often 60 or 70), closely placed, overlapping, pendulous, unilateral. Calyx divided almost to the base into 5 acute spreading segments, the uppermost one smallest, all pulverulent. Corolla $1\frac{1}{2}$—$2\frac{1}{2}$ inches long, tubular-bell-shaped, flattened above, inflated beneath, suddenly contracted into a cylindrical base, obscurely 2-lipped, the upper entire or faintly bilobed, somewhat recurved, the lower distinctly 3-lobed with the central one much the longest, crimson outside above, paler beneath, the lower lip furnished with long hairs inside, and marked with dark crimson spots, each surrounded with a white border.

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* From *digitale*, the finger of a glove.

Stamens 4, arising from the base of the corolla, and entirely included in it; filaments thick, the two lower kneed, longer than the upper; anthers 2-celled, cells diverging. Ovary conical, 2-celled; ovules numerous; placentas large, spongy, axile; style filiform, shortly bifid. Capsule ovoid, acuminate, about $\frac{5}{8}$ths of an inch long; pericarp thin, papery, splitting septicidally into 2 valves, which also separate from the axis; seeds abundant, minute, oblong or ovoid, cylindrical, light brown, deeply alveolate; embryo straight in axis of endosperm.

Habitat.—Perhaps the handsomest of our indigenous plants, and common in most parts of the country on dry sandy or gravelly soils in open woods, heaths, and hedgebanks, making a great show in places where it is abundant; in perfection in July. It is curiously absent from a few of the eastern counties, for example, Cambridgeshire. It grows in most parts of Europe, but is entirely absent from some calcareous districts, *e. g.* the chain of the Jura; it also occurs in Madeira and the Azores, but is perhaps introduced there.

Benth. in DC. Prod., x, p. 451; Syme, E. Bot., vi, p. 127; Hook. f., Stud. Fl., p. 266; Wats., Comp. Cyb. Br., p. 262; Gren. & Godr., Fl. France, ii, p. 602; Lindl. Fl. Med., p. 502.

Official Part and Name.—Digitalis Folia. The dried leaf; collected from wild indigenous plants when about two thirds of the flowers are expanded (B. P.)—The leaves (*Digitalis Folia*); gathered when about two thirds of the flowers are expanded (I. P.)—Digitalis. The leaves; from plants of the second year's growth (U. S. P.)

Collection.—The leaves are directed to be gathered when about two thirds of the flowers are expanded, because at this time, that is, before the ripening of the seeds, they are in the most active state. The reason of this may be explained as follows:—There are two series of compounds formed by the action of light and air in plants, those of one series having for their object their nutrition, and being therefore directly concerned in their growth and development, and those of the other series, called secretions, playing no active part in plants after their perfect formation, and

being also commonly formed later in their life. In the process of flowering the only compounds that are taken up in any amount are those which are concerned in the growth and development of new tissues ; no further growth can therefore take place (to any great extent at least), in the vegetative organs of a plant, after the flowering stage has commenced ; but the secretions by the removal of these nutritive products become more concentrated, and the organs in which they are produced, by being left for a longer period in connection with the plant, have time to elaborate them more perfectly.

The leaves should be collected in the second year of the plant's growth, as directly stated in the United States Pharmacopœia, and also implied in the directions of the British and Indian pharmacopœias, as the plant does not flower till the second year. But the first year's leaves are frequently substituted for those of the second year's growth ; as are also the leaves of *Inula Conyza*, DC., Ploughman's Spikenard, and those of *Symphytum officinale*, Linn., Comfrey, *Verbascum Thapsus*, Linn., Mullein, and other plants ; and as these are sometimes not readily distinguished from the official leaves, it is better for pharmacists to purchase the fresh plant when in flower, which can scarcely be mistaken for any other, and strip and dry the leaves for themselves.

General Characters and Composition.—The botanical characters of the fresh leaves have been already given. When bruised, they have an unpleasant herbaceous odour ; but when dried their odour is agreeable, and resembles tea. The dried leaf has a very bitter taste. *Digitalis seeds* were formerly official, and are by some preferred to the leaves.

Digitalis leaves and seeds contain a non-nitrogenised neutral principle called *digitalin*, to which their properties are essentially due ; but this name has been applied by chemists to widely different substances, both crystalline and amorphous, but what relation these substances have to one another, as well as their respective physiological actions, are questions yet to be solved. The digitalin which is official in the British, Indian, and United States pharmacopœias, as well as in the French Codex, is the *Digitalin*

of Homolle. One hundred parts of dried leaves yield about 1·25 of this digitalin.

Medical Properties and Uses.—Digitalis is a very powerful drug, acting especially as a sedative of the heart's action, and also as a diuretic. Digitalin also produces effects similar to those of digitalis leaves, but the experiments of Homolle, Bourchardat, and Sandras show that it is at least one hundred times as powerful as the powder of the dried herb. Much care is necessary in the administration of digitalis, and more especially so of digitalin, as the latter is a very powerful poison. Digitalis also acts as an acro-narcotic poison in large doses, and even when administered in small doses for a length of time, it is liable to accumulate in the system, and to manifest its presence all at once by its poisonous action. Hence the action of digitalis in all the forms in which it is administered should be carefully watched. Digitalis is a powerful and valuable remedy in dropsy, especially when this is connected with affections of the heart. In some heart diseases it is also a most effectual remedy in reducing the force and velocity of the circulation. It has also been employed in fever, in various inflammatory diseases, in delirium tremens, with marked success in large doses, frequently repeated, in acute mania, spermatorrhœa, epilepsy, croup, hæmoptysis, menorrhagia and other forms of uterine hæmorrhages, and in various other diseases, with real or supposed benefit. Digitalin has similar uses to digitalis; it is reputed to be a powerful anaphrodisiac.

Ph. Jl., 2nd ser., vol. iii, p. 475; Per. Mat. Med., by Bentley and Redwood, p. 588; Pharmacographia, p. 423; U. S. Disp., by W. and B., p. 361; Gar. Mat. Med., 1868, p. 296; Per. Mat. Med., vol. ii, part 1, pp. 523, and 528—537.

DESCRIPTION OF PLATE.

Drawn from a specimen in the R. Botanic Soc.'s Garden, Regent's Park. 1. Plant (reduced). 2. Summit of raceme. 3. Radical leaf. 4. Corolla laid open from below. 5. Summit of style and vertical section of ovary. 6. Transverse section of the ovary. 7. Capsule burst and the seeds fallen. 8. A seed. 9. Section of same. (5 and 6 enlarged; 8 and 9 highly magnified.)

N. Ord. SCROPHULARIACEÆ.

Tribe *Veroniceæ*.

Genus Veronica,* *Linn.* B. & H., Gen., ii, p. 964. Species at least 160, natives chiefly of temperate and colder regions.

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193. Veronica virginica, *Linn., Sp. Plant., ed.* 1, *p.* 9 (1753).

Culver's Root. Culver's Physic.

Syn.—V. purpurea, *Steud.* Leptandra virginica, *Nutt.* Eustachya purpurea *and* E. alba, *Rafin.* Pæderota virginica, *Walp.*

Figure.—Hoffm., Com. Gott., xv, t. 1 (ex Benth.).

Description.—A perennial herb, with a short horizontal, often branched rootstock, giving off numerous long slender roots. Stems 2—6 feet high, erect, simple, usually smooth. Leaves in whorls of 4—7, very shortly stalked, spreading, lanceolate, attenuate at both ends, acute, sharply serrate, glabrous, smooth on both sides, paler beneath, the upper ones much smaller. Flowers very shortly stalked or nearly sessile, small, very numerous, arranged in moderately dense, narrow, erect, acute spikes, 6—12 inches long, terminal and from the axils of the uppermost whorl of leaves; bracts small, but longer than the calyx, acute. Calyx small, cut nearly to the base into 4 lanceolate, very acute, erect segments, glabrous, persistent. Corolla tubular, 4 times the length of the calyx, somewhat arched, divided about ¼ down into 4 (rarely 5) oval, acute, erect teeth, the upper one the broadest, the lower the narrowest, pale blue or nearly white. Stamens 2, inserted near the base of the corolla, one on either side of the upper lobe, filaments twice the length of the corolla, slender, flattened, minutely hairy, much exserted; anthers rather large, dorsifixed, 2-celled, the cells confluent at the apex, purple. Ovary superior, 2-celled, tapering into the style, which is shorter than the stamens but exceeds the corolla, stigma entire,

* *Veronica*, a mediæval name of uncertain origin; perhaps a modification of *Betonica*, one species (*V. serpyllifolia*) being so called by Paulus Ægineta.

terminal. Fruit a very small, oblong-ovoid, compressed capsule, tipped by the long persistent style, dehiscing by 4 teeth at the apex, 2-celled. Seeds minute, very numerous, oblong, curved, black, embryo small in abundant endosperm.

Habitat.—This pretty species is a native of the eastern United States, where it grows in rich woods from Vermont and Wisconsin southwards in the hills to Georgia. It flowers in July and August, and is frequently cultivated in American gardens, and much more rarely in English ones. The plant is sometimes pubescent, and the flowers vary from white to flesh-coloured and purple. The leaves are occasionally considerably narrower than above described.

This differs conspicuously from the bulk of the plants included in the genus *Veronica* by its habit, its whorled leaves, and the tubular corolla. With two other species it constitutes Nuttall's genus *Leptandra.*

A. Gray, Man. Bot. U. States, p. 332; Chapman, Fl. South. States, p. 295; Benth., in DC. Prod., x, p. 463.

Official Part and Name.—Leptandra; the root of Leptandra virginica, *Nuttall* (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India. Leptandra was introduced into the first edition of the Pharmacopœia of the United States, when it was placed in the Secondary List under the name of Veronica. It occupied a similar position in the second edition of the U. S. P.; but was omitted altogether in the third and fourth editions of that volume; and was again placed in the fifth issue of the U. S. P. in the Primary List, under the new name of Leptandra.

General Characters and Composition.—Leptandra root as it is commonly called, is properly speaking the rhizome with the roots attached. When entire, the *rhizome* is either undivided or branched, and commonly several inches in length; and has attached to it a variable number of long slender roots. As met with, however, in a dried state in commerce, the *rhizome* is generally broken up into pieces, which vary in length from about three

quarters of an inch to an inch and a half; and in thickness from about $\frac{1}{6}$ to $\frac{1}{3}$ of an inch. These pieces are very hard, of a dark colour on their external surface, but pale-coloured internally, and are broken with difficulty. The *roots* which are either attached to the rhizome, or separated from it, are several inches in length, being frequently more than six inches when entire, but they are commonly broken into shorter portions; they are filiform, smooth, and of the same colour as the rhizome, but darker, being nearly black. When the roots are separated from the rhizome, the latter is very rough from bearing their fractured remains. Both rhizome and roots have only a slight odour, but their taste is disagreeably bitter, and somewhat acrid.

The properties of leptandra are extracted both by water and alcohol. Leptandra has been submited to chemical examination by Wayne of Cincinnati, and Professor Mayer, but it requires a more complete investigation. According to Wayne, it contains *volatile oil, extractive, tannic acid, gum, resin,* and a peculiar crystalline principle, which is supposed to be its active constituent, and which it has been proposed to call *leptandrin,* but this name is commonly, although incorrectly given, to the impure resinous matter, which is precipitated when water is added to a tincture of leptandra. This is the leptandrin of the eclectic practitioners in the United States, and that which is met with in commerce, and used as a medicinal agent. This leptandrin, which occurs in the form of a black shining powder, is a combination of resinous matter with the true crystalline leptandrin, to which it probably owes its activity; but on this point nothing definite is known, as the crystalline leptandrin has not been isolated for use in medicine. The crystalline leptandrin is stated to be soluble in water, alcohol, and ether; and to have the bitter taste of the root. Leptandra is also said to contain a saccharine principle, which Wayne found to have the properties of *mannite;* and a saponaceous principle, resembling senegin, which Mayer has proved to be a glucoside.

Medical Properties and Uses.—When fresh leptandra is said to act violently as a cathartic, and in some cases as an emetic; but the

dried root is described by Wood as much milder and less certain in its action. Both the dried root and the impure resin called leptandrin, are regarded as excellent cholagogues by the eclectic practitioners in the United States, and are largely used by them as substitutes for mercurials. Waring says, "the effect of leptandrin is gently to excite the liver and promote the secretion of bile without producing the least irritation of the bowels. It does not purge at all, and even its laxative effect is very slight, while on the stomach it acts as a decided tonic; hence it is most valuable in diarrhœa and chronic dysentery, when the stools are destitute of bile, and the mucous membrane is irritable." In torpidity of the liver it is thought to be superior to Blue Pill. It has also been given with quinine, in intermittents; and is regarded as a valuable remedy in some forms of dyspepsia. Its administration in epidemic dysentery and cholera infantum has also been much commended. It is frequently given by the eclectics in combination with podophyllin and iridin; which latter substance has been recently highly spoken of by Dr. Rutherford as a cholagogue. The reputation of leptandra as a medicinal agent would appear to have been established in the United States, from its having been placed in the Primary List of the U. S. P.; but at the same time it must be observed that the accounts of its use by regular medical practitioners are somewhat conflicting. It is desirable, however, that the virtues of both the dried root and impure resin (leptandrin) should be carefully tested in this country.

U. S. Disp., by W. & B., p. 524; Grover Coe's Concentrated Organic Medicines, p. 192; Waring's Manual of Pract. Therap., p. 541; Wayne, in Proc. Amer. Pharm. Assoc. (1856), p. 34, and Amer. Journ. Pharm. (1859), p. 557; Mayer, in Amer. Journ. Pharm. (1863), p. 298; Procter, in Amer. Journ. Pharm. (1868), p. 112; Lancet, Aug. 30, 1862, p. 239.

DESCRIPTION OF PLATE.

Drawn from a cultivated specimen in the British Museum. 1. Portion of stem with a whorl of leaves. 2. Summit of stem with flower-spikes. 3. A flower. 4. Corolla laid open. 5. Calyx and pistil. 6. Transverse section of ovary. 7, 8, 9. Capsule. 10. Section of the same. (3–6, 8–10 enlarged.)

D Blair, F.L.S. ad sicc. del. et lith.

M&N Hanhart imp.

ANDROGRAPHIS PANICULATA, *Nees*

N. Ord. Acanthaceæ. Lindl., Veg. Kingd., p. 678; Le Maout and Dec., p. 604.

Tribe *Justicieæ*.

Genus Andrographis,* *Wall.* B. & H., Gen., ii, p. 1099. Species 14, found in India, one also in some other tropical countries.

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197. Andrographis paniculata, *Nees ab Esenbeck, in Wallich, Plant. Asiat. Rar.* iii, *p.* 116 (1832).

Kariyát ; Maha-tita (Bengal).

Syn.—Justicia paniculata, *Burm.*

Figure.—Wight, Icones Plant. Ind. Orient., ii, t. 518.

Description.—Annual. Stem about 1½ or 2 feet high, erect, stiff, thickened at the lower nodes, quadrangular with the angles slightly winged, smooth, with very numerous long divaricate branches. Leaves opposite, 2—3 inches long, very shortly stalked, lanceolate or oval, tapering at both ends but especially at the base into the petiole, entire, smooth, dark green above, much paler beneath, with the lateral veins prominent. Flowers very numerous, rather small, on slender divaricate or slightly deflexed pedicels beset with stalked glands, distantly arranged singly or in pairs in a somewhat unilateral manner along the upper side of the elongated, arching, slender branches, the whole forming a very wide-spreading, much-branched cymose panicle ; bracts very small, subulate, smooth, usually 3 at the base of each pedicel. Calyx small, divided almost to the base into 5 equal linear-subulate segments covered with stalked glandular hairs. Corolla narrowly tubular for about half its length, then 2-lipped, rose-pink, glandular, hairy outside, the upper lip arched, bifid, the lower about as long as the upper, straight, cut into 3 short acute lobes. Stamens 2, inserted in the throat of the corolla and about equalling the lips, filaments flattened, tapering, ciliate above,

* *Andrographis*, from *ἀνήρ*, stamen, and *γραφίς*, a writing-style; from the form of the filaments.

adherent by their apices where is a large deflexed tuft of hairs just beneath the anthers; anthers 2-celled, sub-basifixed. Ovary small, much laterally compressed, with a small annular disk round the base, smooth, 2-celled, with a few ovules in each cell, style about as long as the stamens, stigma slightly bifid. Fruit ¾—1 inch long, oblong-linear, acute, compressed, smooth, 2-celled, pericarp thin, dry, dehiscing loculicidally into two valves deeply grooved on the back, which separate, each carrying away half the dissepiment. Seeds few (6—10) roundish-ovoid, slightly compressed, on stout erect funicles which are prolonged at the top into a straight, tongue-shaped, acute process (retinaculum), testa thick, hairy; embryo curved, cotyledons ovate, thick; no endosperm.

Habitat.—A very common plant in nearly all parts of India and Ceylon, growing in dry shady places. It is also found in Java. It is cultivated in some parts of India and has been introduced into Mauritius and several of the West Indian islands. In India it flowers in the wet and cold season. We have not met with it in cultivation in England.

Roxburgh, Fl. Indica, i, p. 117; Nees, in DC. Prod., xi, p. 515; T. Anderson, in Journ. Linn. Soc., ix, p. 502.

Official Parts and Names.—Andrographis Caules et Radix; *Kariyát; Creyat;* the dried stalks and root (I. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of the United States. It is known in Bengal under the Hindústani name of *Maha-tita,* signifying *king of bitters.* It is also one of the drugs that is to be found in the bazaars of India under the name of *chiretta,* as mentioned in our description of Ophelia Chirata.

General Characters and Composition.—As seen in commerce in a dried state, *karyàt* usually consists of the stems with the roots attached, and also provided with leaves and flowers. The flowers are, however, sometimes absent, and but few roots may be found. The stems are a foot or more in length, obtusely quadrangular, straight, knotty, branched, longitudinally furrowed, and free from hairs. They have a lightish brown colour, and a persistent bitter

taste; but no marked odour. The characters of the leaves and flowers have been given in our botanical description. The roots are tapering, unbranched, and furnished with numerous small rootlets; these have a grey colour externally, and are whitish within. The taste of the root is similar to, but more bitter than, the stem.

No complete analysis of karyàt has been published, the nature of its bitter principle is therefore unknown. It appears to contain besides the *bitter principle* to which its activity is supposed to be due, a little *tannic acid*, and a large amount of *chloride of sodium*.

Medical Properties and Uses.—It has bitter tonic and stomachic properties, like chiretta, quassia, and gentian. It has been employed with benefit in cases of general debility, in convalescence after fevers, and in the advanced stages of dysentery; and the root when combined with myrrh and aloes, as in the compound tincture of karyàt of the Pharmacopœia of India, is described by Waring, as tonic, stimulant, and gently aperient, and valuable as a remedy in the treatment of several forms of dyspepsia, and in torpidity of the alimentary canal. In the Bengal Pharmacopœia this tincture is given as representing the former celebrated bitter tincture termed by the Portuguese of India *droga amara*, but the authors of Pharmacographia say that the bitter employed in that preparation was calumba.

The expressed juice of the fresh leaves is a common native domestic remedy in India in the bowel complaints of children.

Pharmacopœia of India, pp. 162 & 459; Fleming's Asiat. Researches, vol. xi; Ainslie's Mat. Med., vol. i, p. 96; Drury, Useful Plants of India, p. 36; Roxburgh, Flor. Ind., vol. i, p. 117; Pharmacographia, p. 424; Indian Med. Gaz., 1866, vol. i, p. 220; Waring, in Indian Ann. of Med. Sci., vol. v, p. 618.

DESCRIPTION OF PLATE.

Drawn from a plant in the British Museum, collected in Bengal by Drs. Hooker & Thomson. 1. The chief part of the plant, with flowers and fruit. 2. A flower. 3. Corolla laid open. 4. Ovary. 5. Vertical, and—6. Transverse section of the same. 7. Fruit dehisced. 8, 9. Portions of the valves. 10, 11. Seeds. 12. Section of the same. (2–6, 8–11 enlarged.)

D Blair, F.L.S. ad. nat. del. et lith.

SESAMUM INDICUM, DC.

M. & N. Hanhart. imp.

N. Ord. PEDALIACEÆ. Lindl., Veg. Kingd., p. 669; Le Maout and Dec., p. 607.

Tribe *Sesameæ*.

Genus Sesamum,* *Linn.* B. & H., Gen., ii, p. 1058. About 10 species are known, all African; one spread also throughout the warmer regions of the globe.

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198. Sesamum indicum, *Linn., Sp. Plant., ed.* 1, *p.* 634 (1753).

Sesamé. Til, Gingeli (India).

Syn.—S. orientale, *Linn.*

Figures.—Rumph., Herb. Amboin., v, t. 76, f. 1; Wight, Illust. Ind. Bot., t. 163; Bot. Mag., t. 1688.

Description.—An annual herb. Stem reaching 3 or 4 feet in height, erect, more or less branched, bluntly angular and striate, smooth or shortly hairy especially in the upper parts. Leaves numerous, alternate or subopposite, without stipules, on long petioles, very variable in form, oblong-lanceolate or ovate, usually tapering at the base, but sometimes rounded or even cordate, entire or irregularly toothed or cut into 3 more or less distinct lobes or even separate leaflets, smooth or slightly pubescent, prominently veined beneath. Flowers shortly stalked, erect, solitary in the axils of the leaves. Calyx very deeply cut into 5 narrow, oblong, acute segments, hairy. Corolla tubular-campanulate, about 1½ inches long, narrow below, shallowly divided into 5 blunt, short, spreading, unequal lobes, the lower largest, ovate, forming a lip, pale pink, downy outside, smooth within, imbricate in æstivation. Stamens 4, inserted near the base of the corolla and included, didynamous, the lower pair the longer, filaments smooth, anthers dorsifixed, 2-celled, dehiscing longitudinally. Ovary oblong, densely hairy, surrounded by a small fleshy disk, spuriously 4-celled, with numerous axile ovules, style filiform, shorter than the corolla, stigma bifid, the segments flattened. Fruit a capsule 1—2 inches long, narrowly oblong, quadrangular-compressed, with

* *Sesamum, σησάμη* in Greek, the classical name; from the Arabic *Simsim.*

rounded angles, pointed, surrounded at the base by the persistent calyx, falsely 4-celled, pericarp leathery, pale olive green, densely pilose, splitting loculicidally from above into 2 valves through the false dissepiments which continue to close the spurious cells. Seeds numerous, horizontal, small (about $\frac{1}{5}$ inch long), rounded triangular or oval in outline, flattened, testa smooth, thick, varying in colour, embryo straight, radicle short; no endosperm.

Habitat.—This pretty annual is now found cultivated in all parts of the tropical and hot districts of the globe. Its original home is doubtless the Indian peninsula, where it is also known to have been cultivated from the earliest times. It gradually spread westward and in the middle ages was grown in Egypt, Cyprus, and Sicily. In the latter island it is still in cultivation as well as in Malta, Greece, and Turkey, but it will not grow in other parts of Europe. In Persia, many parts of China (especially Formosa), and Java it is largely grown, as well as on the east coast of Africa. In both North and South America and in the West Indies is it also cultivated.

As with other cultivated plants, a large range of variations are found; the leaves especially are unusually variable. In India the wild plant has the flowers a dark purplish pink, while those under cultivation are nearly white. The colour of the seeds also differs, being white, yellow, orange red, brown or black. *S. orientale*, L., is now considered by most descriptive botanists to be indistinguishable as a species from *S. indicum*.

Both varieties were first grown in this country by Miller in 1731. They are very tender plants and require careful treatment to flower here. We have not seen them in any of our botanic gardens.

The dehiscence of the capsule superficially examined appears to be septicidal, but the false dissepiments through which it occurs are mere projections from the wall, and divide the real cells each into two.

Roxb., Fl. Indica, iii, p. 100; DC. Prod., ix, p. 250; Flück. and Hanb. Pharmacogr., p. 425.

Official Parts and Name.—1. Sesamum; the leaves of Sesamum

indicum, and Sesamum orientale: 2. Oleum Sesami; the fixed oil of the seed (U. S. P. *Secondary*). These substances are not official in the British Pharmacopœia, or the Pharmacopœia of India.

1. Sesamum or Sesami Folium.—*General Characters.*—Benne leaves abound in a mucilaginous or gummy principle which they readily impart to cold water and form a thick transparent mucilage. Hubbell, of Philadelphia, by precipitating this mucilage from a watery solution with alcohol, has prepared a substance which he calls *sesamine* or *benne-leaf gum*, which on being dissolved in water, he says, reproduces the mucilage in nearly the same condition as when fresh.

Medical Properties and Uses.—An infusion made by adding one or two of the full-sized fresh leaves to about half a pint of cold water, and occasionally stirred, is much used in the Southern States of North America as a demulcent drink in cholera infantum, and other disorders of the bowels in children. It is also employed in catarrh and affections of the urinary organs. The infusion is sometimes made with the dried leaves; but in this case hot water should be substituted for the cold. This remedy has likewise been successfully used in other parts of the United States. The leaves also serve for the preparation of emollient poultices. Benne leaves are also much valued in the treatment of dysentery in some parts of Australia; and within the last few years the mucilage obtained from the leaves of the Indian-grown plant has been very successfully employed in the treatment of the milder forms of dysentery in India. Evers, who thus administered it, says "the drug acts simply as a demulcent, and does not, in my opinion, exert any specific influence on the disease; furthermore, it is necessary to combine an opiate with it, to relieve the tenesmus, so that probably the opium added has as much to do in checking the disease as the mucilage itself."

2. Oleum Sesami.—*Production.* — This oil is known under various names, as *Sesamé oil, Benne oil, Til* or *Teel oil*, and *Gingeli, Gingili, or Jinjili oil.* There are several varieties of seed which are distinguished from their colour; the three more

D Blair, ad nat del et lith.

M & N Hanhart imp

LAVANDULA VERA, *DC.*

N. Ord. LABIATÆ.

Tribe *Ocymoideæ*.

Genus Lavandula,* *Linn.* B. & H., Gen., ii, p. 1179. Species 20, inhabitants of the Mediterranean district and S. W. Asia.

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199. Lavandula vera, *DC., Fl. Franc., Supp., p.* 398 (1815).

Lavender.

Syn.—L. Spica, var. *α*, *Linn.* L. vulgaris, var. *α*, *Lam.* L. officinalis, *Chaix.* L. pyrenaica, *DC.* L. angustifolia, *Hayne.*

Figures.—Hayne, viii, t. 37; Nees, t. 178; Berg & Sch., t. 26 b; Nees, Gen. Fl. Germ.; Reich., Ic. Fl. Germ., xviii, t. 26, fig. 1.

Description.—A shrub of 1 to 3 feet high (or somewhat taller in gardens), with a short but irregular, crooked, much branched stem covered with yellowish-grey bark which comes off in flakes, and very numerous, erect, straight, broom-like, slender, bluntly quadrangular branches, finely pubescent with stellate hairs. Leaves opposite, entire, sessile, linear, blunt, when young white with a dense tomentum of stellate hairs on both surfaces and the margins strongly revolute, when full-grown over 1½ inch long, green, pulverulous with scattered hairs above, smooth or very finely downy beneath, the margins slightly revolute. Flowers very shortly stalked, 3—5 together in little opposite cymes in the axils of ovate, acuminate, brown, scarious bracts, and thus forming dense few-flowered whorls 4—10 in number, crowded at the extremity of long naked branches in short blunt spikes, the lowest whorl often separated by a long internode from the rest. Calyx ovoid-oblong, tubular, somewhat contracted at the mouth, with a single, tongue-like ovate tooth at the back, the rest of the margin almost straight and truncate, 13-nerved, densely covered with a close tomentum of blue stellate hairs and minute glands. Corolla tubular, wider above, about twice the length of the calyx, 2-lipped,

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* *Lavandula*, or *Lavendula*, apparently a name of the middle ages, indicating the use of the plant in baths (*lavare*, to wash).

slightly hairy outside, violet coloured, mouth oblique, upper lip large erect, divided into 2 blunt lobes, lower lip shorter, cut into 3 nearly equal blunt segments, tube very hairy within. Stamens 4, inserted about the middle of the tube, filaments short, white, 2 anterior longer, anthers 2-celled, dark purplish-brown, cells rounded, divaricate, fringed with hairs, pollen orange. Style about as long as the corolla-tube, stigma blunt, shortly bifid. Achenes smooth, pale brown.

Habitat.—The Lavender grows wild in hilly districts at a considerable elevation above the sea in the south of France, Spain, Northern Italy and other parts of the Mediterranean region, including North Africa, but does not reach Asia Minor. As a garden plant it is a very old favorite, being quite hardy in this country and throughout Northern and Central Europe. In the neighbourhood of Mitcham it is grown on a large scale, and it is also cultivated at Hitchin and in Lincolnshire.

L. latifolia, Vill. (L. Spica, var. β, *Linn.*, L. Spica, *DC.*), is now maintained by most writers as a distinct species from *L. vera*. It is a more delicate plant, and cannot be cultivated in the open air in this country. It is figured in Hayne, viii, t. 38, Nees, t. 179, and Steph. and Church., t. 40, and has a very close similarity to the common Lavender.

Gren. & Godr., Fl. France, ii, p. 647; Willk. & Lange, Prod. Fl. Hisp., ii, p. 391; Flück. & Hanb., Pharmacogr., p. 428; Lindl., Fl. Med., p. 485.

Official Parts and Names.—Oleum Lavandulæ; the oil distilled in Britain from the flowers (B. P.). The oil (*Oleum Lavandulæ*) obtained by distillation from the flowers (I. P.). Lavandula; the flowers (U. S. P.).

1. Lavandula, *Lavender flowers.*—These flowers have a greyish-blue colour when dried, a strong fragrant odour, and a warm, bitterish, aromatic taste. Their odour is long retained after drying. The flowering stalks are usually gathered in the early part of July, and either dried entire in the shade or by a gentle heat, and then made up into bundles; or the flowers are stripped from the stalks and dried by a moderate heat.

The essential constituent of lavender flowers is the volatile oil (*Oleum Lavandulæ*), which is described below.

Medical Properties and Uses.—The flowers are carminative, mildly stimulant, and tonic, but they are not now employed in a crude state in medicine, at least, in this country, and but very little elsewhere. The flowers and leaves were formerly used as a sternutatory; and probably still enter into the composition of some cephalic snuffs. Burnett says, "The ancients employed the flowers and the leaves to aromatise their baths, and to give a sweet scent to water in which they washed; hence the generic name of the plant." They are still used to some extent to perfume linen, &c., and as a preventive to the access of moth; and also when powdered, as an ingredient in sachets, &c.; their principal use is, however, as the source of the volatile oil.

2. Oleum Lavandulæ, *Oil of Lavender.—Preparation.* The oil is usually distilled from the flowers and flower-stalks conjointly, as gathered and brought from the fields, and either fresh or in a more or less dried state; some distil the flowering part only, while a few distil the flowers alone after they have been stripped entirely from the stalks. The finest oil is obtained by the latter process; that derived from the stalks is small in quantity and of inferior quality, and its admixture with the former therefore deteriorates its quality. When distilled with the stalks, it is said that the finest oil is drawn during the first two hours and a half, and is considered to come from the flowers; that which comes afterwards is second or third quality. The amount of oil, according to Bell, obtained from the flowers deprived of stalks, afforded on an average of three years, 1½ per cent.; and at Hitchin, according to Perks, 60 lbs. of good flowers yield on an average 16 fluid ounces of oil. Mr. Perks has also informed us that an acre of land will yield "about 6 Winchester quarts" of oil.

General Characters and Composition.—Oil of Lavender is pale yellow, with the very fragrant odour of the flowers, and a hot, bitter, aromatic taste. It is lævogyrate; and has a specific gravity which varies according to Zeller, from 0·87 to 0·94. It is

a mixture in varying proportions of a fluid hydrocarbon and stearoptene, which, according to Dumas, is identical with camphor. Oil of Lavender is also produced to some extent in the south of France and Piedmont ; but the foreign oil is of very inferior quality, the best foreign oil only fetching about one sixth of the price of the best English oil.

Medical Properties and Uses.—Oil of Lavender has stimulant and carminative properties, and is used in hysteria, nervous headache, and other nervous affections ; also in flatulence and colic. It is chiefly given in the form of the official compound tincture and spirit of lavender. It is also commonly employed for scenting evaporating lotions, as well as ointments, and liniments.

The more important consumption of oil of lavender is, however, in perfumery, in which it is still extensively employed, although not to the same extent as formerly.

Per. Mat. Med., by B. & R., p. 581; Pharmacographia, p. 428; U. S. Disp., by W. & B., pp. 523 and 1309; Piesse's Art of Perfumery, p. 93; Bell, in Pharm. Journ., vol. viii, 1st ser., p. 276; Bentley, in Pharm. Journ., vol. i, 2nd ser., p. 278; Warren, in Pharm. Journ., vol. vi, 2nd ser., p. 257.

DESCRIPTION OF PLATE.

Drawn from a plant in the Apothecaries' Garden, Chelsea.

1. A branch with inflorescence.
2. Lateral, and—3. Front view of a flower.
4. Corolla cut open.
5. Calyx laid open.
6. Pistil.

(2–6 enlarged.)

D Blair F.L.S. ad nat. del. et lith.

M & N Hanhart imp.

HEDEOMA PULEGIOIDES, *Pers*

N. Ord. Labiatæ.

Tribe *Satureieæ*.

Genus Hedeoma,* *Pers.* B. & H., Gen., ii, p. 1188. Species about 12, all American.

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200. Hedeoma pulegioides, *Persoon, Syn. Plant.*, ii, *p.* 131 (1807).

American Pennyroyal.

Syn.—Cunila pulegioides, *Linn.* Melissa pulegioides, *Linn.* Ziziphora pulegioides, *R. & S.*

Figures.—Barton, t. 41.

Description.—An annual herb, with a small branched root. Stem very much branched, 9—15 inches high, slender, obscurely quadrangular or terete, pubescent, branches opposite, weak, ascending. Leaves opposite, stalked, spreading, closely placed, the largest about an inch long, upper ones becoming smaller, rhomboid-oval, blunt at apex, attenuated into the petiole at the base, entire, or with a few large blunt shallow serratures in the middle, smooth above, slightly pubescent, strongly veined, paler and dotted with glands beneath. Flowers shortly stalked, small, few (usually 3) in each axillary cyme, forming very small lax whorls. Calyx tubular-ovoid, slightly gibbous at the base on the under side, ribbed and closely hairy externally, with a ring of hairs in the inside at the throat; scarcely 2-lipped, deeply divided into 5 ciliated teeth, the 3 upper narrowly triangular, the 2 lower with subulate points. Corolla small, pubescent outside, pale blue, the tube scarcely exceeding the calyx, 2-lipped, the upper lip small, slightly bifid, erect, the lower spreading, deeply 3-lobed, the middle lobe rather the longest. Stamens 4, only 2 fertile, the upper pair reduced to sterile filaments, or quite wanting, exserted, anthers 2-celled, the cells divergent. Style about as long as the stamens, bifid. Achenes ovoid, smooth.

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* *Hedeoma*, altered from ἡδύοσμον, the name used by Theophrastus for some sweet-smelling herb.

Habitat.—This is a very common plant throughout the United States and extends north into Canada and south into Mexico. It grows in dry places, especially by roadsides, but in the south only on the hills; the flowers are produced from July till late in the autumn.

The plant has no beauty to recommend it, but has been grown in a few botanic gardens here, as at Glasnevin, Dublin.

A. Gray, Man. N. U. States, p. 350; Chapman, Fl. South. States, p. 316; Hook., Fl. Bor.-Am., ii, p. 113; Benth., in DC. Prod., xii, p. 244; Lindl., Fl. Med., p. 491.

Official Parts and Name.—HEDEOMA; the leaves and tops (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—*Hedeoma* or *American Pennyroyal*, when fresh, has a powerful, agreeable, aromatic odour, which somewhat resembles the *European Pennyroyal* or *Mentha Pulegium;* hence its common name; this odour is retained to a great degree by the dried herb. Its taste is warm, pungent, camphoraceous, and mint-like. It imparts its virtues to boiling water, but more fully to alcohol.

The properties of hedeoma depend upon the presence of a *volatile oil*, which is diffused throughout the whole herb, and may be readily separated from it by distillation. This oil, which is official in the United States Pharmacopœia under the name of *Oleum Hedeomæ*, has a pale yellow colour when recent, but it becomes darker by keeping; and the odour and taste of the herb. It is lighter than water, its specific gravity being 0·948.

Medical Properties and Uses.—The effects of hedeoma are closely analogous to those of the official mints, being mildly stimulant, aromatic, carminative, and stomachic. In the form of a warm infusion, which may be made in the proportion of half an ounce of the herb to a pint of water, and given in doses of two or more ounces, it acts as an efficient diaphoretic, and also as an emmenagogue, more especially when taken at bedtime, and the feet at the same time placed in warm water. Hence it is

largely employed in domestic practice in commencing catarrh and muscular rheumatism; and to bring on the menstrual discharge when this has been delayed by cold or other temporary causes. Hedeoma is also used to relieve flatulent pains and nausea, and to correct the action and cover the unpleasant taste of other medicines.

The volatile oil has similar properties to the herb, and is frequently used in domestic practice to promote the flow of the menses. It is also employed as a flavouring agent, and in other cases where the herb has been found useful. It has been likewise used externally as a constituent of rubefacient liniments.

U. S. Disp., by W. & B., pp. 437 and 1308; Wood's Therapeutics and Pharmacology, vol. i, p. 345; Stille's Therapeutics and Materia Medica, vol. i, p. 507.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in Virginia.

1. Upper portion of a plant.
2. A flower.
3. Section of calyx.
4. Corolla laid open.

(2–4 enlarged.)

J.Blow FLS ad nat. del et lith.

M&N Hanhart imp

MENTHA PULEGIUM, *Linn.*

N. Ord. LABIATÆ.

Tribe *Saturieæ*.

Genus **Mentha**,* *Linn.* B. & H., Gen., ii, p. 1182. Species very variously estimated; natives of temperate climates in both the Old and New World.

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201. Mentha Pulegium,† *Linn., Sp. Plant., ed.* 1, *p.* 577 (1753).

Pennyroyal. Pudding-grass.

Syn.—Pulegium vulgare, *Mill.*

Figures.—Woodville, t. 122; Steph. & Ch., t. 45; Nees, t. 167; Hayne, xi, t. 39; Syme, E. Bot., vii, tt. 1041, 1042; Reichenb., Ic. Fl. Germ., xviii, t. 1290; Nees, Gen. Fl. Germ.

Description.—A perennial herb. Stem decumbent at the base and rooting at the lower nodes, afterwards ascending, 3—12 inches long, (rarely quite erect), slender, bluntly quadrangular, smooth or hairy, branched, the lower branches prostrate, spreading, bearing leaves only, the upper ascending or erect, floriferous. Leaves opposite, stalked, small, about ½ inch long, oval, obtuse, entire or crenate and wavy at the margin, slightly hairy or nearly glabrous, dark green above, pale and gland-dotted beneath, often recurved. Flowers on rough red pedicels, about as long as the calyx, arranged in dense, opposite, axillary cymes, forming almost globular distant whorls, bracteoles obovate, often absent. Calyx funnel-shaped, cylindrical, hispid, 10 ribbed, dotted with glands, purple, cut into 5 narrowly triangular, acuminate, ciliated teeth, the two lower longer and narrower, making the calyx somewhat 2-lipped, throat with a ring of stiff hairs which close it in fruit. Corolla twice as long as the calyx, tubular-funnel-shaped, deeply divided into 4 unequal blunt lobes, the two lateral shortest, pale reddish-purple,

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* *Mentha*, in Greek μίνθη, the classical name.

† *Pulegium*, *Pulecium*, or *Puleium*, the Latin name of the plant: according to Pliny, because the smell of the burnt flowers kills fleas (*pulices*). The English name "Pennyroyal" is a corruption of the old herbalist's name "Pulioll-royall, *Pulegium regium*."

smooth inside, hairy without. Stamens 4, filaments long, much exserted.

Habitat.—Pennyroyal grows in damp gravelly places, especially by the borders of pools on heaths and commons. It is not uncommon in such places in England and Ireland, but is not native in Scotland. It is now far less frequent here than previously to the enclosure of waste and common lands. Its exotic range is extensive, the whole of Europe except the extreme north, Western Asia, Northern Africa, the Canaries, Azores, and Madeira; in North America it is an introduction.

Boswell Syme describes and figures a variety *erecta* with stout erect stems not rooting at the base; a very woolly form also sometimes occurs.

Syme, E. Bot., vii, p. 23; Hook. f., Stud. Fl., p. 281; Watson, Comp. Cyb. Brit., p. 269; Trimen & Dyer, Fl. Middlesex, p. 212; Gren. & Godr., Fl. France, ii, p. 654; Ledebour, Fl. Ross., iii, p. 340; Benth., in DC. Prod., xii, p. 175; Lindl., Fl. Med., p. 487.

Parts Used and Names.—Mentha Pulegium, or Pulegium; the flowering herb and the volatile oil of pennyroyal were formerly official in the London, Edinburgh, and Dublin Pharmacopœias, but they are not recognised in the British Pharmacopæia; the Oil of Peppermint from Mentha piperita, *L.*, and the Oil of Spearmint from Mentha viridis, *L.*, both of which are described by us under the names of the plants yielding them, being alone official in the B. P. Neither is Pennyroyal official in either the Pharmacopœia of India, or in that of the United States. The herb which is known in the United States as American Pennyroyal, is described by us under Hedeoma pulegioides, *L.*, which is its botanical source. It is official under the name of Hedeoma in the U. S. P.

General Characters, Cultivation, and Composition.—The botanical characters of the herb are fully described above. It has a strong, peculiar odour, somewhat resembling that of spearmint, but is generally regarded as less agreeable; its taste is at first warm, aromatic, and bitterish, but followed by a sensation of coolness.

These properties are retained to some extent by the dried plant when carefully prepared. The plant is cultivated at Mitcham; it is generally sold in a dried state.

The properties of pennyroyal are essentially due to the presence of a *volatile oil*, which may be readily obtained from it by distillation with water. It is known in pharmacy as *Oleum Pulegii*. Pennyroyal also contains a *bitter matter*, *tannic acid*, and other unimportant ingredients.

Oil of Pennyroyal is sometimes distilled from the fresh herb in this country, but the oil used here is more commonly obtained from France or Germany, which is much lower in price. According to Brande, 1 cwt. of fresh pennyroyal affords an average produce of 1 lb. of volatile oil. This oil is nearly colourless or pale yellow, with a warm taste, and the peculiar odour of the herb; it has a sp. gr., according to Kane, of 0·925, and it boils at about 395°.

Medical Properties and Uses.—Pennyroyal has been supposed to possess the power of driving away fleas, whence its specific name. It was formerly regarded as emmenagogue, antispasmodic, and expectorant; and was employed as a remedy for obstructed menstruation, and for relieving hysterical complaints, whooping-cough, and asthma. Like the other mints it possesses carminative and stimulant properties; but it is far inferior to peppermint, and hence the latter has almost entirely superseded it in regular practice, but it is still in some repute as a domestic medicine. The distilled water of pennyroyal is the best form of administration. The oil may also be used as a stimulant and carminative, in doses of from two to five minims taken on sugar.

Gerarde's Herball., by Johnson, p. 671; Brande, Dict Mat. Med., p. 357; Christ. Disp., p. 633; Thoms., Disp. by Garrod, p. 465; Per. Mat. Med., vol. ii, pt. 1, p. 514; Pharmacographia, p. 436; Kane, Phil. Mag., vol. xiii, p. 442.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in the Apothecaries' Garden, Chelsea.

1. The plant in flower. 2. A flower. 3. Calyx laid open. 4. Corolla cut open. (2–4 enlarged.)

M&N. Hanhart imp.

MENTHA VIRIDIS, *Linn.*

N. Ord. LABIATÆ.
Tribe *Satureieæ*.
Genus **Mentha**, *Linn.*

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202. Mentha viridis, *Linn., Sp. Plant, ed. 2, p. 804 (1762).*

Spear Mint. Common Garden Mint. Mackerel Mint.

Syn.—M. sylvestris, var. glabra, *Koch.* M. spicata, *Crantz.*

Figures.—Woodville, t. 121?; Steph. & Ch., t. 45; Nees, t. 166; Hayne, xi, t. 36; Sole, Brit. Mints, t. 5; Syme, E. Bot., vii, t. 1023; Reich., Ic. Germ., xviii, t. 1284, fig. 1.

Description. — Rootstock perennial, with elongated suckers. Stems herbaceous, 2—3 feet or more high, erect, acutely quadrangular, with erect-patent, opposite branches, smooth or very slightly hairy, often tinged with bright purple. Leaves opposite, sessile, or the lowest very slightly stalked, lanceolate or oblong-lanceolate, 2—4 inches long, rounded at the base, acute at the apex, dark green, serrate, smooth on both surfaces, or slightly hairy on the veins below, paler and thickly glandular beneath. Inflorescence of numerous spikes of verticils terminating the stem and branches; spikes narrow, acute, elongated, with numerous distinct whorls, the lower ones considerably separated; flowers small, on perfectly smooth pedicels; bracteoles linear, subulate, slightly fringed. Calyx nearly regular, bell-shaped, cylindrical, 10-ribbed, purplish, dotted with glands, quite smooth, 5-toothed, the teeth lanceolate-subulate, as long as the tube, ciliate. Corolla about twice the length of the calyx, pale purple, naked within and without. Stamens 4, included or exserted, filaments equal. Style exserted, bifid at apex. Achenes smooth.

Habitat.—The common mint is a well-known garden plant, and is in all probability a cultivated race of *M. sylvestris*, L. (Horse-mint), a coarse woolly plant of wide distribution. It has been in cultivation in England for many centuries, and occurs occasionally here in a semi-wild state. Mr. Baker considers it truly indi-

genous in the north of England. It also grows in kitchen gardens in most parts of Europe, Asia, and the Cape of Good Hope, North and South America, &c., and is cultivated for medicinal purposes at Mitcham, Surrey, and in the United States. It flowers in August and September, and is sometimes found with crisped leaves.

Smith, E. Fl., iii, p. 75; Baker in Journ. Bot., 1865, p. 239; Syme, E. Bot., vii, p. 7; Hook. f., Stud. Fl., p. 279; Gren. & Godr., Fl. Fr., ii, p. 649; Benth. in DC., l. c., p. 168; Lindl. Fl. Med., p. 486.

Official Parts and Names.—Oleum Menthæ Viridis. The oil distilled in Britain from fresh flowering spearmint (B. P.)—The oil (*Oleum Menthæ viridis*), obtained by distillation from the fresh herb when in flower (I. P.)—Mentha Viridis. The leaves and tops (U. S. P.)

General Characters and Composition.—The botanical characters of the herb have been already given. It has a strong aromatic peculiar odour, and a warm slightly bitter taste resembling that of peppermint, but less pungent, and to many more agreeable. These properties are somewhat less marked in the dried herb, but are retained for a long time. The medicinal virtues of the plant essentially reside in the official oil of spearmint. This oil is colourless, pale yellow, or greenish when recently prepared, but it becomes red by age. It has the odour and taste of the herb; it has a specific gravity of 0·914, and boils at 320°. According to Gladstone, it consists of a hydrocarbon almost identical with oil of turpentine mixed with an oxidised oil, to which is due the peculiar smell of the plant.

Medical Properties and Uses.—The medical properties of spearmint are similar to, although feebler than, peppermint. These are aromatic, carminative, mildly stimulant, and stomachic. The oil is carminative and stimulant, and is also used as a flavouring ingredient. Spearmint water possesses similar properties, but is chiefly used as a vehicle for other medicines. Spearmint is also frequently employed for culinary purposes; and the oil is used

in the United States as a perfume by soap manufacturers, and as a flavouring agent, &c., by confectioners.

Per. Mat. Med., vol. ii, part 1, p. 510; U. S. Disp., by W. and B., pp. 560 and 1310; Pharmacographia, p. 431; Stephenson and Churchill's Medical Botany, by Burnett, vol. i, pl. 45.

DESCRIPTION OF PLATE.

Drawn from a plant grown in the Royal Botanic Society's Garden, Regent's Park, London.

1. A flower.
2. Corolla cut open.
3. Vertical section through calyx and ovary.

(1—3 enlarged.)

M&N Hanhart imp

MENTHA PIPERITA, *Sm*

N. Ord. LABIATÆ.
Tribe *Satureieæ*.
Genus **Mentha**.

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203. Mentha piperita, *Smith in Trans. Linn. Soc., vol.* V (1800), *p.* 189. (*non Linn.*)

Peppermint.

Syn.—M. officinalis and M. hircina, *Hull.* M. piperita, var. officinalis, *Koch.* M. viridi-aquatica, *F. Schultz.*

Figures.—Woodv., t. 120; Steph. & Ch., t. 45; Nees, t. 163?; Hayne, xi, t. 37; Berg & Sch., t. 23 c; Sole, Brit. Mints, tt. 7 and 8; Syme, E. Bot., vii, t. 1024, 1025.

Description.—A perennial herb, with a rootstock which gives off long suckers. Stems erect or nearly so, 3—4 feet high, square, smooth or slightly hairy, green or purplish, branched at the base; branches long, spreading. Leaves all stalked; petioles of the lower ones ½ an inch or more long, of the upper shorter; leaves dark dull green above, paler and covered with minute glands beneath, smooth or nearly so, lanceolate, oval or ovate, varying in width, sharply serrate, the base narrowed or rounded, the apex acute. Inflorescence composed of several whorls, forming a terminal, loose, conical spike, the whorls separated below; lower bracts leaf-like, apex of spike pointed or rounded; flowers shortly stalked; pedicels smooth, purplish, glandular; bracteoles lanceolate, acuminate, slightly fringed. Calyx cylindrical, campanulate, glabrous, dotted with glands, purple; the teeth triangular, cuspidate, half as long as the tube, ciliate. Corolla about twice as long as calyx, pale purplish red, glabrous inside and out, upper lip emarginate. Stamens 4, filaments short, equal, included. Style exserted, bifid at its extremity. Achenes smooth or rugose.

Peppermint is readily recognised from spearmint by its uniformly stalked leaves, thicker and more crowded inflorescence, larger flowers, and shorter calyx-teeth, as well as by the familiar warm pungent odour and taste. It presents two forms, distin-

guished as var. *officinalis* (*M. piperita*, Huds.), with narrower leaves and more elongated spikes, and var. β. *vulgaris* (*M. piperita*, Hull) with broader leaves more rounded at the base, and with spikes more blunt and close; but many specimens are intermediate in character, as was the case in the one figured. It is probably correct to regard the plant as a cultivated race of the common water mint, *M. hirsuta*, Linn., with which var. β is indeed connected by numerous intermediate forms.

Habitat.—It is doubtful whether *M. piperita* is anywhere known truly wild, but it is recorded from watery places in many parts of England and Scotland, extending as far north as Forfarshire and Inverness-shire, flowering in August and September. It is difficult to trace its distribution out of England; but it occurs in many parts of Europe, Asia and North America, under similar conditions to those under which it exists in this country. It is extensively cultivated for medicinal use at Mitcham, Surrey, and in Lincoln, Cambridge and Herts (Hitchin). At the first-named place two kinds are recognised, and we are indebted to Dr. Piesse, of New Bond Street, for specimens of the "black" and "white" mints of the Mitcham fields. The former is a much coarser plant than the latter, and is more tinged with purple; it also flowers somewhat later, and the oil it affords, though more abundant, is less valued; there are no botanical characters to separate the plants. Peppermint is also grown on a large scale in America, and in France, Germany and Southern India.

Sm., E. Fl., iii, p. 76; Baker in Journ. Bot., 1865, p. 240; Syme, E. Bot., vii, p. 9; Watson, Comp. Cyb. Br., p. 268; Hook. f., Stud. Fl., p. 279; Benth. in DC., l. c., p. 169; Lindl. Fl. Med., p. 487.

Official Parts and Names.—Oleum Menthæ Piperitæ. The oil distilled in Britain from fresh flowering peppermint (B. P.)—The oil (*Oleum Menthæ piperitæ*), obtained by distillation from the fresh herb when in flower (I. P.)—Mentha Piperita. The leaves and tops (U. S. P.)

General Characters and Composition.—The botanical characters of the herb have been described above. Peppermint is more pungent than any of the other mints. The herb both in a fresh

and dried state has a peculiar, aromatic, and agreeable odour, and an aromatic, warm, burning, bitterish taste, followed by a sensation of coolness when air is drawn into the mouth. The properties of the herb depend essentially upon the official oil of peppermint. This oil is colourless, pale yellow, or greenish when recent, but like the oil of spearmint it becomes reddish by age. Its sp. gr. varies from 0·84 to 0·92. It has a powerful penetrating aromatic taste, like that of the herb, followed by a sensation of cold, and a strong agreeable odour. Oil of peppermint consists of two substances, one fluid, the other solid; the chemical nature of the former has not been determined; the latter, which is sometimes deposited from oil of peppermint, when it is subjected to a cold of about 8° below the zero of Fahrenheit, in the form of colourless hexagonal crystals, is called *menthol* or *peppermint camphor*. Its proportion varies much in different oils. The so-called Chinese oil of peppermint of commerce is distilled at Canton from *Mentha javanica*, Bl. It is pure crystallised menthol. Oil of peppermint upon long standing also deposits a solid crystalline portion, which is commonly termed the Stearoptene of oil of peppermint.

Medical Properties and Uses.—Peppermint is the most agreeable and powerful of all the mints. It possesses aromatic, carminative, stimulant, antispasmodic, and stomachic properties. These qualities are especially possessed by the official oil, which is employed in medicine in flatulence, nausea, flatulent colic of children, spasmodic affections of the stomach and bowels, and is a frequent addition to other medicines to cover their unpleasant taste. It is also extensively employed for flavouring cordials and sweetmeats.

Per. Mat. Med., by B. and R., p. 283; Pharmacographia, p. 434; U. S. Disp., by W. and B., pp. 559 and 1309; Per. Mat. Med., vol. ii, part 1, p. 512; Ph. Jl., Feb. 25, 1871, p. 682, and Oct. 14, 1871, p. 321.

DESCRIPTION OF PLATE.

Drawn from a plant grown in the garden of the Royal Botanic Soc., London.

1. A flower.
2. Corolla cut open.
3. Vertical section of calyx and ovary (1—3 enlarged.).

M&N Hanhart

ORIGANUM VULGARE.

N. Ord. Labiatæ.

Tribe *Satureieæ*.

Genus Origanum,* *Linn.* B. & H., ii, p. 1185. About 25 species are known, natives of Europe and Asia, especially the Mediterranean region.

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204. Origanum vulgare, *Linn., Sp. Plant., ed.* 1, *p.* 590 (1753).

Marjoram. Organy.

Figures.—Hayne, viii, t. 8; Steph. and Ch., t. 131; Curt., Fl. Lond., fasc. 5; Syme, E. Bot., vii, t. 1045; Nees, Gen. Fl. Germ.; Reich., Ic. Flor. Germ., xviii, t. 1262.

Description.—A perennial herb, with a creeping elongated woody rootstock giving off short slender stolons. Stems several, 1—3 feet high, erect, stiff, bluntly quadrangular, more or less pubescent, corymbosely branched only in the upper part, purple. Leaves opposite, spreading, stalked, the lower ones soon withering away, with short undeveloped leafy branches in the axils, ½—1½ inch long, broadly ovate or rhombic-ovate, obtuse or subacute, entire somewhat undulated, pubescent, especially on the prominent veins beneath. Flowers sessile or nearly so, arranged in twos or threes, each with a large, ovate, smooth, veined, purple bract at its base, the little opposite cymes on longish stalks densely arranged so as to form short subcylindrical or subquadrilateral ovoid oblong spikes ¼—½ inch long, which are aggregated at the extremities of the stem and branches, and form collectively a large corymbose panicle. Calyx with a cylindrical tube somewhat enlarged above and five nearly equal acute teeth not half the length of the tube, veined, pubescent externally and dotted with glands, glabrous within except at the throat where is a ring of stiff long hairs, purple. Corolla with the tube pubescent externally, and slightly so inside, larger than the calyx, obscurely 2-lipped, the upper lip slightly bilobed, the lower with three nearly equal rounded lobes, purplish pink. Stamens usually exserted; anthers

* *Origanum*, in Greek ὀρίγανον, the classical name for some strong-smelling labiate plants.

with widely divergent cells, purple. Style shorter than the longer stamens, bifid, with acute divisions. Achenes ovoid, slightly compressed, granulated, brown.

Habitat.—This well-known aromatic herb ranges widely in all European countries (except in the extreme north), and extends eastward through Russia, Siberia, and West Asia generally, to the confines of India. It also grows in Northern Africa and has been introduced into the United States. In England it is principally found on chalky or limestone soils, where it is very abundant on dry banks and bushy places; in Scotland it is less frequently met with. It flowers in August and continues in blossom till late in the autumn. A variety with white flowers is not uncommon, in this the bracts and stems are of a pale green; there is also a variety (rarely met with) in which the spikes are composed of a much greater number of flowers and are elongated and prismatic (*O. megastachyum*, Link.). The length of the corolla varies and the stamens may be either included or exserted.

Syme, E. Bot., vii, p. 29; Hook. f., Stud. Fl., p. 282; Watson, Comp. Cyb. Brit., p. 269; Benth., in DC. Prod., xii, p. 193; Gren. & Godr., ii, p. 656; Ledebour, Fl. Ross., iii, p. 343; A Gray, Man. Fl. U. States, p. 348; Lindl., Fl. Med., p. 490.

Official Part and Name.—ORIGANUM; the herb (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India; but it was formerly recognised in the London, Edinburgh, and Dublin Pharmacopœias.

General Characters and Composition.—Common or Wild Marjoram when fresh has a strong, peculiar, aromatic, agreeable odour; and a warm, bitterish, aromatic taste; both of which properties are preserved when it is carefully dried.

The principal constituents of marjoram are *volatile oil, tannic acid,* and a *bitter principle.* The *volatile oil* was formerly official in the London and Dublin Pharmacopœias; but Hanbury proved some years since, that the oil commonly sold as oil of Origanum was oil of Thyme, as is described by us under *Thymus vulgaris.* The true oil of Origanum, which may be obtained by submitting the herb to distillation with water, may be distinguished, according

to Hanbury, from oil of thyme, by the following characters :—1. Its odour is entirely dissimilar, being somewhat analogous to oil of peppermint ; 2. The colour, which in oil of origanum is bright yellow, is more or less deep reddish-brown in the ordinary kind of oil of thyme. Its specific gravity is ·8854. True oil of origanum is rarely or ever found in commerce.

Medical Properties and Uses.—Marjoram possesses stimulant and carminative properties. It is also regarded as a mild tonic and diaphoretic ; and was formerly held in great repute as an emmenagogue. It may be used for similar purposes as the mints, but at present it is never employed in this country by the medical practitioner, and but little even in the United States. The dried leaves have been used as a substitute for China tea.

The oil is a powerful local irritant, and may be used externally, either alone or mixed with other medicines, for similar purposes as oil of thyme ; although as the latter has been commonly substituted for it, the effects ascribed to oil of origanum are probably those produced by oil of thyme.

The herb called sweet marjoram, *Origanum Marjorana,* was also formerly official in the Pharmacopœias of this country. Its properties and uses resemble those of the wild marjoram. It is cultivated in our gardens, and is used by the cook as a seasoning agent. The dried herb powdered, and also that of the wild marjoram, are said to enter into the composition of some cephalic snuffs.

Per. Mat. Med., vol. ii, pt. 1, p. 515; Steph. & Church, Med. Bot., by Burnett, vol. iii, pl. 131; Christison's Dispensatory, p. 688; Wood, Therap. & Pharmacology, vol. i, p. 347; U. S. Disp., by W. & B., p. 1661; Hanbury, in Pharm Journ., vol. x, ser. i, pp. 6 and 324.

DESCRIPTION OF PLATE.

Drawn from a specimen collected near Greenhithe, Kent. 1. Upper part of flowering stem. 2. A flower with its bract. 3. Corolla laid open. 4. Calyx. 5. Same laid open to show the pistil. 6. Lower portion of plant. (2–5 enlarged.)

D Blair ad nat. del et lith

M & N Hanhart imp

THYMUS VULGARIS. *Linn*

N. Ord. LABIATÆ.

Tribe *Satureieæ*.

Genus Thymus,* *Linn.* B. & H., Gen., ii, p. 1186. Species variously estimated at 50 to 80, nearly all inhabitants of the Mediterranean region.

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205. Thymus vulgaris, *Linn., Sp. Plant., ed.* 1, *p.* 591 (1753).

Garden Thyme. Thyme.

Figures.—Woodville, t. 125; Nees, t. 182; Hayne, xi, t. 2; Berg & Sch., t. 18 e.

Description.—A small, much-branched shrub, scarcely a foot high, the branches ascending, opposite, slender, very bluntly quadrangular, with a pale brown bark, the young shoots purplish-red, pubescent with very short stiff white hairs. Leaves opposite, sessile, $\frac{1}{4}$—$\frac{3}{8}$ inch long, oval or oval-lanceolate, blunt, entire with the margin revolute, thick, smooth, dotted with numerous oil-glands, paler beneath. Flowers polygamous, numerous, on slender stalks arranged in small shortly stalked cymes in the axils of the uppermost leaves and forming terminal rounded capitate heads, often with a few whorls below. Calyx bilabiate, hairy externally, dotted with glands, the upper lip flat of three very short triangular teeth, the lower of two stiff curved subulate teeth about as long as the tube, which has a ring of dense white hair at its mouth within. Corolla small, the tube not much exceeding the calyx, cylindrical, smooth within, the limb nearly flat, spreading, the upper lip emarginate, the lower with 3 blunt rounded lobes, faintly veined. Stamens 4 inserted in the tube of the corolla, with very short equal filaments and small rounded anthers in the female flowers, in the bisexual flowers with long exserted filaments and the two lateral much the longest; anthers kidney-shaped with a wide connective, violet-coloured. Style exserted, longer in the female than in the bisexual

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* *Thymus, θύμος*, the classical name.

flowers, bifid. Achenes elevated on a gynophore, perfectly smooth, brown.

Habitat.—This aromatic fragrant plant grows abundantly in stony places in the Mediterranean countries of Europe from Portugal to Greece, including Corsica and the Balearic Islands, but it does not reach the African coast or extend into Asia Minor.

It is much grown in English kitchen-gardens where it reaches a larger size than in its wild localities; but it is very variable in this respect and in the amount of grey tomentum and arrangement of the verticils of flowers; resembling in this respect the common wild thyme of this country, *T. Serpyllum*, L., to which it is closely allied.

Benth., in DC. Prod., xii, p. 199; Gren. & Godr., Fl. France, ii, p. 657; Willk. & Lange, Prod. Fl. Hispan., ii, p. 403.

Official Part and Name.—Oleum Thymi; the volatile oil obtained from Thymus vulgaris (U. S. P.). It is not official in either the British Pharmacopœia, or the Pharmacopœia of India.

Production, General Characters, and Composition. — Oil of Thyme is derived solely from the South of France. In the neighbourhood of Nismes, according to Hanbury, who visited this district in 1849, the oil is obtained in large quantities by submitting the whole plant to distillation with water. It is distilled at two periods of the year, namely, when the plant is in flower in May and June, and again, late in the autumn. The oil after the first distillation is of a deep reddish-brown colour, and is called *Huile rouge de Thym;* but when re-distilled it becomes colourless, and is then termed *Huile blanche de Thym.* The latter oil is also somewhat less fragrant than the former. Both kinds of oil are purchased by the merchants in the neighbouring towns, and thence exported to other parts. The red oil is that more commonly met with in commerce, and according to Wood and Bache, it is the only kind found in the shops in the United States. This oil is also, as first proved by Hanbury, commonly known as *Oil of Origanum.* The latter oil is, however, very distinct in its characters, and is not found in commerce.

Oil of Thyme consists of a fluid portion, which is a mixture of

two hydrocarbons, termed *Cymene* and *Thymene;* and of a solid crystalline oxidized substance with a strong aromatic odour somewhat resembling that of the crude oil, and a very burning taste, called *Thymol.* Thymol is isomeric with the carvol of oil of caraway, as is noticed in our description of that oil.

Medical Properties and Uses.—Oil of thyme is a useful and powerful local stimulant, and may be applied to a carious tooth by means of lint or cotton to relieve toothache; or when mixed with olive oil or spirit, especially if combined with camphor, as a stimulating liniment in chronic rheumatism, sprains, bruises, &c. The chief consumption of oil of thyme is, however, in veterinary practice. Oil of Thyme is also used for scenting soaps.

Thymol, or Thymic acid as it has been also termed, has been recommended as a disinfectant in the place of carbolic acid, the properties of which it is said to possess, but without its disagreeable smell. It has been highly recommended by Dr. Paquet, Professor of Clinical Surgery at Lisle, who states that it is adapted for all those purposes to which carbolic acid has been applied as a disinfectant.

The herb generally has similar aromatic properties to marjoram, sage, and many other labiate plants, but it is not employed medicinally in this country, although it is often so used on the Continent. In the United States, it is occasionally employed with other aromatic herbs in baths, cataplasms, and fomentations.

The herb is largely used by the cook as a flavouring agent.

Per. Mat. Med., vol. ii, pt. 1, p. 517; Pharmacographia, p. 437; U. S. Disp., by W. & B., p. 621; Gmelin's Chemistry, vol. xiv (1860), pp. 183, 311, and 409; Watts, Dict. Chem., vol. v, p. 793; Hanbury, in Pharm. Journ., vol. x, 1st ser., pp. 6 and 324; Journ. de Pharm. (1868), p. 147.

DESCRIPTION OF PLATE.

Drawn from a plant in the Royal Gardens, Kew, in flower in July. 1. A branch with numerous twigs and flower-heads. 2. A leaf. 3. A female flower. 4. Corolla laid open. 5. Calyx seen from below. 6. Section of calyx. (2–6 enlarged.)

SALVIA OFFICINALIS *Linn.*

D.Blair F.L.S. ad nat. del. et lith.

M & N Hanhart imp.

N. Ord. LABIATÆ. Lindl., Veg. Kingd., p. 659 (*Lamiaceæ*); Le Maout & Dec., p. 620.

Tribe *Monardeæ*.

Genus Salvia,* *Linn.* B. & H., Gen., ii, p. 1194. A very large genus of about 450 species distributed over the warm regions of both worlds.

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206. Salvia officinalis, *Linn., Sp. Plant., ed.* 1, *p.* 23 (1753).

Sage. Garden Sage.

Figures.—Woodville, t. 127; Hayne, iv, t. 1; Nees, t. 161; Berg & Sch., t. 17 f; Lindl., Veg. Kingd., p. 659.

Description.—Perennial. Stems semi-shrubby at the base, ascending or decumbent and giving off roots at the nodes; branches numerous, opposite, straggling, erect, about 3 feet in height, bluntly quadrangular, woolly, especially at the nodes, with short white down. Leaves numerous, opposite, crowded on the barren branches, and with very long, erect, slender, woolly petioles, on the flowering branches sessile, blade 1½—2½ inches long, oval-oblong, narrowed or rounded at the base, subacute at the apex, finely crenate, rather thick, the margins much involute in the bud, slightly pilose and covered with a fine network of veins above, woolly and whitish (especially when young) and with the network raised beneath. Flowers rather large, on short pubescent stalks, arranged in cymes of 3 (or 5), in the axils of opposite, ovate acuminate, veiny, spreading bracts much longer than the pedicels which have also smaller bracts of similar form at their base; each pair of cymes forming a small whorl of which there are five or six placed rather distantly on an erect, stout, quadrangular flower-stem which is often branched below. Calyx tubular-bell-shaped, large, cut about half way down into 2 lips, the upper with 3 triangular acuminate teeth, the lower with 2 teeth which are somewhat larger and more acute, 14-veined, veins prominent, finely pubescent, persistent, purplish. Corolla

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* *Salvia*, the classical Latin name.

rather large, purple, pilose externally, the tube wide, slightly exceeding the calyx, with a ring of hairs near the base inside, 2-lipped, the upper lip rather small, much arched, shallowly bilobed, the lower lip 3-lobed, the lateral lobes small, obtuse, the middle one much larger, broad, truncate, bifid. Stamens 2, inserted in the upper part of the corolla-tube, filaments short, curved, not exserted, anthers with the two cells separated by the long, flat, slightly curved connective, which is attached to the filament by its centre, the anther-cells at the upper ends of the connective only fertile, linear, yellow, those at the lower ends small and empty. Pistil (of 2 carpels) supported on a thick disk (gynophore), the ovary small, very deeply divided into 4 rounded lobes, each containing a single erect ovule, style coming from the base of the ovary, simple, curved, exserted beyond the upper lip of the corolla, bifid. Fruit consisting of 4 distinct, roundish-ovoid, indehiscent, smooth, dull black achenes, attached at the side of their base to the gynophore, and hidden at the bottom of the dry persistent, papery, brown calyx. Seed solitary in each achene and completely filling it, embryo straight with plano-convex cotyledons and an inferior radicle, no endosperm.

Habitat.—Few cottage gardens are without this plant, which has been cultivated here for the last three centuries. Gerard in 1596 had it in his garden represented by several varieties. It is not a native of England or Northern Europe, but is frequent in warm stony places in the South of France, Spain, Italy, Corsica, Dalmatia, Greece, &c. It flowers here in June, and is cultivated with other herbs at Mitcham.

Sage is a variable species, and in the gardens may be found varieties with narrower leaves, crisped or variegated leaves, and smaller or white flowers; the form of the calyx-teeth also varies, and the tube of the corolla is sometimes much longer than as above described. The two usually absent upper stamens are sometimes present as very small sterile bodies.

Benth, in DC. Prod., xii, p. 264; Gren. & Godr., Fl. France, ii, p. 670; Willk. & Lange, Prod. Fl. Hisp., ii, p. 420; Lindl., Fl. Med., p. 489.

Official Part and Name.—Salvia; the leaves (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India; but it was formerly recognised in the London Pharmacopœia.

General Characters and Composition.—The leaves and flowering tops have a strong fragrant odour; and a warm, bitterish, aromatic, feebly astringent taste. An infusion of the leaves becomes black on the addition of sulphate of iron. The plant should be cut for use when in flower, which, in the United States, is in June; it should be then dried in the shade. The leaves are alone official. When carefully dried, the properties of the plant are, in a great measure, retained; but it should not be kept long in a dried state, as it rapidly deteriorates.

The principal constituents of sage leaves are, a *volatile oil*, *bitter extractive*, and *tannic acid*. Their virtues are more especially due to the *volatile oil*, which may readily be obtained by distilling the fresh leaves with water.

The volatile oil of sage has been described as of a green colour changing to brown, more especially when obtained from young plants. The commercial oil has recently been elaborately examined by Patterson Muir, and S. Sugiura, of Owen's College, Manchester. They describe it as of a yellow-brown colour, without any shade of green; of an intensely sage-like odour; hot and burning taste; and with a neutral reaction. They found the oil to consist mainly of two terpenes, an oxidised liquid, and a camphor. The first terpene boils at from about 306° to 312°, and has a specific gravity at about 60° of 0·8435; the second terpene boils at from about 324° to 333°, the specific gravity being 0·8653. The oxidised liquid has been termed *salviol;* it boils at from about 387° to 397°, and has a sp. gr. of 0·934. Sage camphor was obtained in a crystallised state; they conclude that it is almost certainly an isomer of common camphor, but not identical with it. More recent experiments of the same chemists on absolutely pure oil of sage have shown that it consists for the most part of a terpene boiling at from about 508°—516°,

and with a sp. gr. at about 54° of 0·9137. This terpene was of a dark emerald-green colour.

Medical Properties and Uses.—By the ancients sage was in great repute as a medicine, but in Europe it is now never employed by the regular medical practitioner, although it is still used in domestic practice. In the United States it is still, however, in some repute, more especially in the form of an infusion, which is used as a gargle, and wash for the mouth. Sage is regarded as a feeble tonic and astringent, and an efficient aromatic. It was formerly employed as a stimulant tonic in general debility and in weakness of digestion, "as an astringent in checking profuse sweats, and excessive lacteal secretion, as a febrifuge in paroxysmal fevers, as a diaphoretic in catarrh, and as an antispasmodic in various nervous affections." It may be used with advantage, says Dr. Wood of the United States, "as an anti-emetic carminative and gentle stimulant to the stomach and bowels, especially when there is enfeebled digestion with a tendency to diarrhœa." But its principal and most valuable application is as a wash for the cure of aphthous affections of the mouth, and as a gargle in common sore throat and relaxation of the uvula. For this purpose the infusion is the best form ; this may be sweetened with honey if a merely detergent effect is required, " or, if a stimulant or astringent operation is sought, it may be mixed with red wine or with alum, or acidulated with vinegar." When the infusion is required as a gargle, and to produce all the effects of the drug, it should be prepared by macerating an ounce of the leaves in a pint of boiling water, and the maceration continued till it cools. Of this infusion two fluid ounces are a dose. But as a drink to allay nausea, and in febrile affections, it is recommended that the leaves should only be allowed to macerate for a very short time, so that the whole of the bitterness may not be extracted.

The principal consumption of sage is for culinary purposes, the leaves being in common use by the cook as a seasoning and flavouring agent. Formerly, the leaves were much used in this country and elsewhere as a substitute for China Tea.

U. S. Disp., by W. & B., p. 767; Wood, Therap. and Pharmacology, vol. i, p. 348; Stillé, Therap. and Mat. Med., vol. i, p. 524; Miller, Gard. Dict., vol. ii, pt. 2; Cultivation of Sage, in Pharm. Journ., vol. v, ser. 3, p. 182, from the Garden, Aug. 22, 1874; Muir, in Pharm. Journ., vol. vii, ser. 3, p. 265, and Year Book of Pharmacy for 1876, p. 560; Muir and Suguira, in Year Book of Pharmacy for 1877, p. 498, and Pharm. Journ., ser. 3, vol. viii, pp. 191 & 994.

DESCRIPTION OF PLATE.

Drawn from a garden specimen sent from the Isle of Wight by Mr. Stratton.

1. A portion of a plant with leaves and flowers.
2. A flower.
3. Calyx laid open.
4. Corolla laid open.
5. Ovary.
6. Part of flowering-stem in fruit.

7, 8. Fruit.

9—12. Achenes.

13, 14. Vertical; and—15. Transverse section of the same.

(2–5, 8, 10–15 enlarged.)

D'Blair ad nat. del et lith.

M&N Hanhart imp.

ROSMARINUS OFFICINALIS, *Linn.*

N. Ord. LABIATÆ.

Tribe *Monardeæ*.

Genus Rosmarinus,* *Linn.* B. & H., Gen., ii, p. 1197. The only species is the following.

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207. Rosmarinus officinalis, *Linn., Sp. Plant., ed.* 1, *p.* 23 (1753).

Rosemary.

Figures.—Woodville, t. 117; Hayne, vii, t. 25; Steph. & Ch., i, t. 24; Nees, t. 162; Berg & Sch., t. 10 c; Flora Græca, t. 14; Nees, Gen. Fl. Germ.; Jord. and Fourreau, Ic. Pl. Europ., tt. 101—103.

Description.—A small shrub attaining a height of about 4 feet, bushy and much branched, branches cylindrical, bark pale brown, fibrous, the young twigs tomentose. Leaves very numerous, evergreen, spreading, opposite, sessile, 1—1¼ inch long, oblong-linear, blunt at both ends, entire, with the margin strongly revolute, somewhat arched or drooping, thick, dark green and shining above, densely woolly with white stellate hairs beneath. Flowers rather large, shortly stalked, arranged in opposite pairs on short axillary racemose branches rather shorter than the leaves, bracts short, acute. Calyx tubular, wider above, deeply cut into 2 lips, the upper with 3 small teeth, the lower deeply bifid, more or less covered with a white stellate tomentum, internally smooth. Corolla with a short tube scarcely exceeding the calyx, strongly 2-lipped, the upper lip erect, oblong, cut into 2 lanceolate segments, the lower lip with 2 spreading oval lateral segments and a large dependent concave trifid central one with the lobes denticulate, slightly hairy externally, smooth within, pale dull blue, the lower lip spotted with purple and white. Stamens 2, filaments with a small reflexed tooth below the middle, anther-cells linear, coherent, dorsifixed; 2 small

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* *Rosmarinus*, or as two words, *Ros marinus* (literally sea-dew), the classical name for the plant.

staminodes representing the posterior stamens are sometimes present. Style tapering, exserted, exceeding the upper lip of the corolla, stigma bifid, the upper lobe very short. Achenes subglobose, smooth.

Habitat.—A native of the Mediterranean district, and common near the coast in warm dry hilly situations in the whole region from Spain to Asia Minor, being abundant in Northern Africa, and also reaching Madeira and the Canary Islands.

Rosemary is one of the most ancient of our garden plants, and still a favourite. It flowers in April and May, and is generally hardy through our winters. The wild plant is gathered for use in the South of France, North Italy, &c.

A remarkable variety from Algeria has much larger flowers on longer stalks, and a very glandular calyx.

Gren. & Godr., Fl. France, ii, p. 669; Willk. & Lange, Prod. Fl. Hisp., ii, p. 419; Benth., in DC. Prod., xii, p. 360; Lindl., Fl. Med., p. 489.

Official Parts and Names.—Oleum Rosmarini; the oil distilled from the flowering tops (B. P.). The oil obtained by distillation from the flowering tops (I. P.). Rosmarinus; the leaves (U. S. P.).

1. Rosmarinus. — The whole plant has a strong, peculiar, agreeable, aromatic odour, more especially the flowering tops; and a warm, bitterish, aromatic taste. The properties of rosemary are more or less impaired by drying; and if long kept the odour is entirely lost.

The principal constituents of rosemary are a *volatile oil,* upon which its properties essentially depend, *bitter matter,* and *tannic acid.*

2. Oleum Rosmarini. — *Production and Commerce.* Oil of Rosemary is directed in the British Pharmacopœia to be distilled from the flowering tops, and the same directions are given in the Pharmacopœia of India, but in the Pharmacopœia of the United States the leaves only are official as the source of the oil. Practically, nearly all the oil of commerce is distilled

from the stem and leaves in the summer months, and when the plant is not in flower; although some oil is obtained from the flowering tops, and is regarded as of superior quality to the former. The oil is principally derived from the South of France and the contiguous Italian Coast; but a good deal is also said to come by way of Trieste to France and Italy from Dalmatia. Scarcely any oil is distilled in England, but that so obtained is of fine quality. One pound of the fresh plant is stated to yield about one drachm of the oil.

General Characters and Composition.—Oil of Rosemary is colourless or pale yellow, with the peculiar odour of the plant, and a warm aromatic taste. Its specific gravity has been variously given, thus by Buignet and Kane at about 0·896, and by Gladstone at 0·908; it boils at 365°, is feebly dextrogyre, and is readily soluble in alcohol. According to Gladstone, it consists almost entirely of a hydrocarbon like that obtained from the volatile oil of the Common Myrtle; but Lallemand describes it as resolvable into two fluid portions—the one a very liquid hydrocarbon, boiling at 329°, and the other boiling between 392° and 410°, and depositing at a low temperature a large quantity of a stearoptene analogous to ordinary camphor.

Medical Properties and Uses.—Rosemary possesses stimulant and carminative properties; and has a popular reputation as an emmenagogue, but at the present day it is rarely employed in medical practice. It is said to be sometimes added to sternutatory powders. A weak infusion of the fresh leaves is occasionally used as a substitute for ordinary tea by hypochondriacal persons, and by dyspeptics. The admired flavour of Narbonne honey is ascribed to the bees feeding on the flowers of this plant.

The volatile oil of rosemary is a powerful stimulant and carminative. It is frequently used externally in combination with other substances as a stimulating liniment to promote the growth of the hair, for which it has a great popular reputation. It is also an ingredient in some rubefacient liniments. It is likewise used as an odoriferous adjunct to lotions and other external

applications; and is also occasionally given internally in hysteria, and nervous headaches.

Oil of rosemary is extensively employed in perfumery. It enters into the composition of "Eau de Cologne," and it is the principal ingredient in the once celebrated "Hungary Water."

Per. Mat. Med., vol. ii, pt. i, p. 520; Pharmacographia, p. 439; Steph. & Ch., Med. Bot., by Burnett, vol. i, pl. 24; U. S. Disp., by W. & B., pp. 743 and 1311; Gmelin's Chemistry, vol. xiv (1860), p. 397; Beckman's History of Inventions, by Johnston (1791), vol. ii, p. 107.

DESCRIPTION OF PLATE.

Drawn from a specimen in Kew Gardens.

1. A branch with flowers.
2. The calyx.
3. The corolla laid open.
4. Vertical section of calyx.
5. Section of ovary.

(2–5 enlarged.)

DBlair F.L.S. ad.nat. del. et lith.

M&N.Hanhart imp.

MONARDA PUNCTATA, *Linn.*

N. Ord. Labiatæ.

Tribe *Monardeæ*.

Genus Monarda,* *Linn.* B. & H., Gen., ii, p. 1197. Species 6 or more, natives of North America.

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208. Monarda punctata, *Linn., Sp. Plant., ed.* 1, *p.* 22 (1753).

American Horse-Mint.

Syn.—M. lutea, *Michaux*.

Figures.—Bot. Register, t. 87; Bot. Repository, t. 546; Bot. Cabinet, t. 1437.

Description.—A perennial herb. Stem erect, stout, reaching two feet or more high, stiff, quadrangular, covered with a fine greyish pubescence, slightly branched. Leaves opposite, on longish petioles, 2—4 inches long, lanceolate, attenuated into the petiole at base, acute at apex, slightly and distantly serrate, closely dotted with glands beneath, veined, the lateral veins running parallel towards the apex. Flowers very shortly stalked, in few- (usually 5-) flowered, axillary, opposite cymes, forming dense whorls, one terminating the stem, surrounded by a circle of 6—8 large, leaf-like, sessile, oval, acute, entire, pale yellow and purplish-pink bracts. Calyx tubular, slightly wider at the mouth, finely downy outside, smooth within, with 15 ribs, divided into 5 small, triangular, nearly equal, rigid, acute, ultimately spreading teeth, gland-dotted. Corolla large, yellow, the tube narrow, scarcely exceeding the calyx, inflated above, 2-lipped, the upper lip very large, arched, concave within, slightly notched, the margin somewhat undulated, slightly hairy on the top, spotted with purple, lower lip small, 3-lobed, the lateral lobes obtuse, the middle narrower, all somewhat crisped at the margin. Stamens 2 (with the rudiments of the upper pair sometimes also present), inserted

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* In honour of Nicolas Monardes, a physician of Seville, who made known the medicinal products of the New World in a great work first published in Spanish in 1569, and afterwards edited by Clusius, in Latin, with figures, in 1574.

in the throat of the corolla, filaments very long, slender, somewhat exserted, anthers at first 2-celled, the cells linear, divaricate, afterwards confluent. Stigma with 2 unequal branches. Achenes ovoid, smooth.

Habitat.—A native of dry sandy places in North America, extending from New York southwards to Florida and Texas, and flowering from July to October. It is fairly hardy in this country, where it was introduced in 1714, but in spite of its handsome appearance is now rarely seen in our gardens.

A. Gray, Man. Bot. N. U. States, p. 352; Chapman, Fl. South. States, p. 320; Benth., in DC. Prod., xii, p. 363.

Official Parts and Name.—MONARDA; the leaves and tops (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—*Monarda,* or *Horsemint* as it is commonly termed, has a strong aromatic odour, and a warm, pungent, bitterish taste; these properties are retained in the dried herb, when it has been carefully prepared. It imparts its virtues in a great measure to boiling water, but more especially to alcohol.

Monarda owes its properties essentially to the presence of a *volatile oil,* which is diffused more or less throughout the whole herb, and may be readily obtained from it by distillation. *Oleum Monardæ* or *Oil of Horsemint* is official in the United States Pharmacopœia; it has a yellowish-red colour, a fragrant odour, and a very pungent taste. It is readily separated into a fluid portion which is said to have the odour of thyme; and a solid crystalline body having the odour and taste of the oil, and regarded as identical with the *thymol,* described by us under *Thymus vulgaris.*

Substitution.—It is stated that in the United States the wild basil (*Pycnanthemum incanum,* Michx.), is very commonly substituted for monarda or horsemint.

Medical Properties and Uses.—Monarda has analogous properties to the official mints; but it is regarded as more stimulating

and less agreeable. In the form of a warm infusion, prepared of the same strength and given in like doses to that of the infusion of hedeoma, it acts like it as an excellent diaphoretic and emmenagogue. This infusion may also be administered to allay nausea, relieve flatulence, and to act as a diuretic; but it is very little employed by the regular medical practitioner.

The oil of horsemint has also been given internally as a carminative and stimulant. But its chief use is an external application, either in its pure state, when a speedy and powerful effect is desired; or under ordinary circumstances, it should be diluted before being applied, with olive oil or soap liniment, in the proportion of one part of the oil of monarda to two or four parts of either of the latter substances. When thus used it is a powerful rubefacient, and when pure even vesicant. It may be employed in all cases in which rubefacients are indicated, as in chronic rheumatism, cholera infantum, low forms of fever, in hemiplegia and other forms of paralysis, and in various local pains.

U. S. Disp., by W. & B., pp. 563 and 1310; Wood's Therapeutics and Pharmacology, vol. i, p. 346; Stille's Therapeutics and Materia Medica, vol. i, p. 513; Watt's Dict. Chem., vol. iii, p. 1046; Bonsall, in Amer. Journ. Pharm., vol. xxv, p. 200; Proc. Amer. Pharm. Assoc. (1875), p. 502.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in New Jersey by Nuttall.

1. Upper part of flowering plant.
2. A flower.
3. Vertical section of calyx.
4. Corolla laid open.
5. End of style.

(2–5 enlarged.)

D Blair ad nat del et lith.

M&N Hanhart, imp

NEPETA CATARIA, *Linn.*

N. Ord. LABIATÆ.

Tribe *Nepeteæ*.

Genus Nepeta,* *Linn.* B. & H., Gen., ii, p. 1199. Species 120, chiefly found in the extra-tropical regions of the old world.

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209. Nepeta Cataria,† *Linn., Sp. Plant., ed.* 1, *p.* 570 (1753).

Catmint. Catnep.

Syn.—Cataria vulgaris, *Moench.*

Figures.—Hayne, iv, t. 8; Syme, E. Bot., viii, t. 1054; Reichenb., Ic. Fl. Germ., xviii, t. 1242.

Description.—A perennial herb with a thick rootstock and erect, stout, stiff, quadrangular, finely but densely pubescent stems, 2 or 3 feet high, with spreading branches. Leaves opposite, on longish stalks, ovate or oblong-ovate, with a cordate base and acute apex, 1—3 inches long, strongly and deeply dentate-serrate, pubescent on both sides, densely so and grey beneath. Flowers numerous, very shortly stalked, arranged in dense paniculate cymes, the lower stalked, the upper sessile, aggregated at the ends of the stem and branches into short, broad, blunt, rounded spikes, bractlets setaceous, and, with the pedicels &c., grey-pubescent. Calyx tubular, ovate-oblong, somewhat gibbous below, with 15 ribs, densely pubescent, oblique at the mouth, divided into 5 triangular subulate teeth, the uppermost one the longest. Corolla with a rather short, curved tube, dilated above, pubescent externally, smooth within, upper lip small, rounded, notched, lower lip 3-lobed, the two lateral lobes small, the middle large, dilated, concave, rounded, truncate, the edge dentate, whitish or pale pink, dotted with lilac, buds pale orange. Stamens 4, under the upper lip, scarcely exserted, upper pair longest, anther-cells divaricate and continuous, purple. Achenes rather large, dark brown, granular.

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* *Nepeta*, the classical name for the plant.

† *Cataria*, a mediæval herbarists' name, from the fondness of cats for this species.

Habitat.—In this country Catmint occurs on dry banks and waste ground, chiefly in the South of England, and especially on chalky soil, and flowers in the late summer and autumn. There seems to be no very good reason for regarding it otherwise than as a truly native plant here. It grows throughout Europe, and extends into Siberia, Western Asia, and the Himalaya. In the United States of America it has become naturalised, and is now a common weed near habitations.

Syme, E. Bot., viii, p. 38; Hook. f., Stud. Fl., p. 285; Watson, Comp. Cyb. Br., p. 277; A. Gray, Man. U. States, p. 353; Benth., in DC. Prod., xii, p. 383; Gren. & Godr., Fl. France, ii, p. 675; Ledebour, Fl. Ross., iii, p. 374.

Official Part and Name.—CATARIA, *Catnep;* the leaves and tops (U. S. P.). Before the issue of the present United States Pharmacopœia, the leaves only were recognised in that volume. It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—*Catnep,* or *catmint* as it is also termed, derives its names from the fondness of cats for it, especially when it is withered. The dried entire herb is commonly used in the United States. It has a strong, peculiar, somewhat aromatic, and disagreeable odour, suggestive of a mixture of Mint and Pennyroyal; and a warm, bitterish, aromatic, and camphoraceous taste.

No complete analysis has been made, but the active constituents are stated to be a *volatile oil* and *tannic acid.* It is probable also that it contains some *bitter matter.* Its virtues are extracted by water; and its cold watery infusion assumes an olive-green tint on the addition of a persalt of iron.

Medical Properties and Uses.—Catnep had formerly some reputation in this country in domestic practice as a remedy in chlorosis and other diseases of women, but it appears to have almost or entirely gone out of use. In the United States it is, however, a good deal employed in domestic practice; but although it has been long retained in the Primary List of the Materia

Medica in the Pharmacopœia of that country, it is but little employed by the regular medical practitioner. Its properties do not appear therefore to be very marked; although it is reputed to closely resemble the mints in its action, and to be mildly stimulant, tonic, antispasmodic, and emmenagogue. It is commonly administered in the form of infusion, and has been used in hysteria, chlorosis, amenorrhœa, flatulent colic of infants, and in other affections. When chewed, or locally applied in other ways, to a diseased tooth, it is said to relieve toothache.

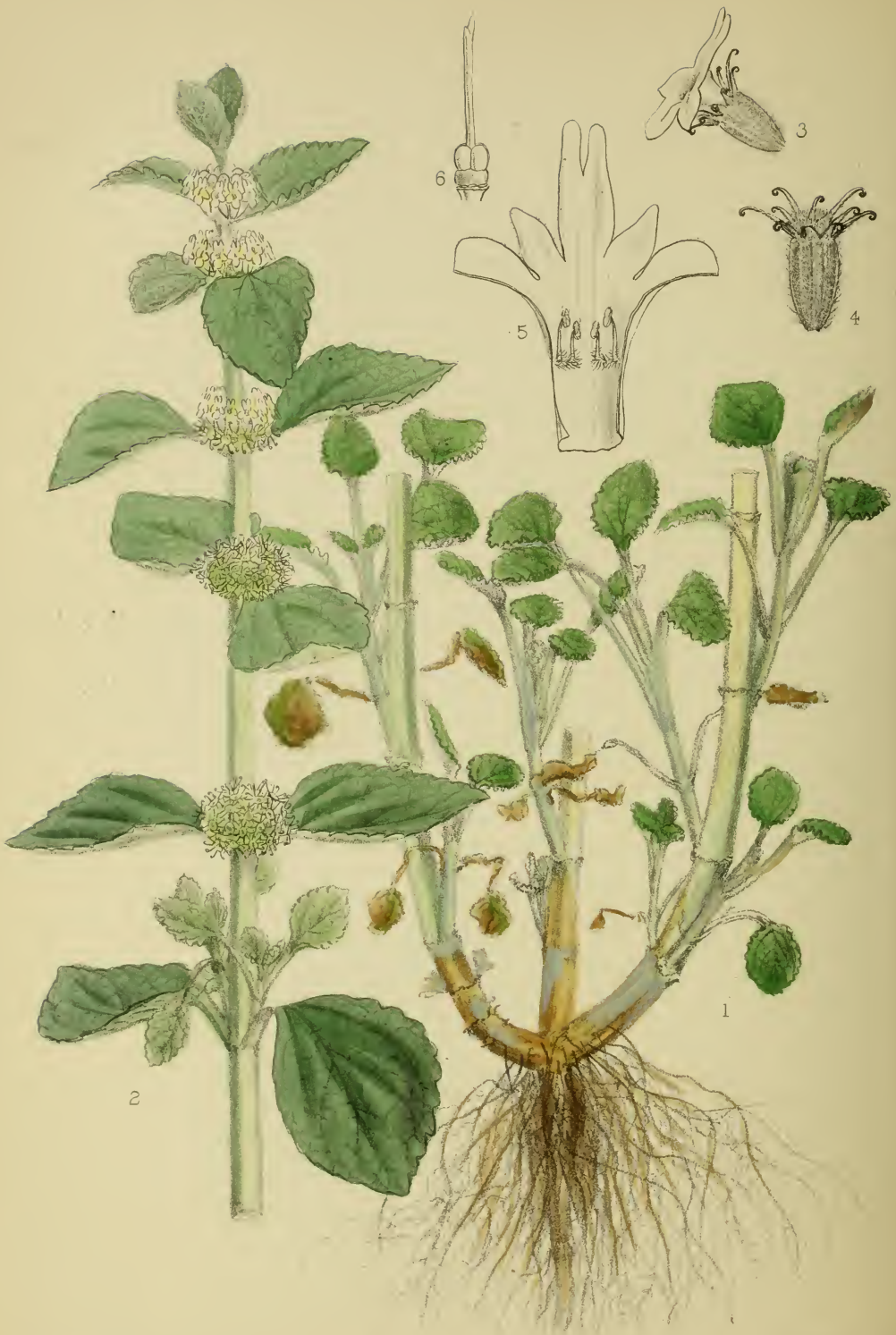
Gerarde's Herball, by Johnson (1636), p. 783; Miller's Gard. Dict., vol. ii, pt. 1; U. S. Disp., by W. & B., p. 240.

DESCRIPTION OF PLATE.

Drawn from a specimen collected by Mr. Britten at High Wycombe, Bucks, flowering in August.

1. Upper part of a flowering stem.
2. A flower.
3. A calyx.
4. Corolla laid open.
5. Anthers.
6. Pistil.
7. Section through gynophore.

(2–7 enlarged.)



D.Blair ad nat. del. et lith

M&N.Hanhart imp.

MARRUBIUM VULGARE, *Linn.*

N. Ord. Labiatæ.

Tribe *Stachydeæ*.

Genus **Marrubium**,* *Linn.* B. & H., ii, p. 1206. Species 30, natives of temperate Europe and Asia and the Mediterranean region.

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210. Marrubium vulgare, *Linn., Sp. Plant., ed.* 1, *p.* 583 (1753).

Horehound. White Horehound.

Figures.—Woodville, t. 118; Steph. & Ch., t. 135; Nees, t. 174; Hayne, xi, t. 40; Berg & Sch., t. 24 b; Syme, E. Bot., vii, t. 1064; Reich., Ic. Fl. Germ., xviii, t. 1224.

Description.—A perennial herb with a short rootstock giving off several stout, tough stems, about 1 foot high, branched below, bluntly quadrangular, more rounded below, densely covered, especially when young, with a thick white cottony felt. Leaves opposite, blade reaching an inch in length, on a long, broad, woolly petiole, ovate, acute or blunt, coarsely crenate-serrate, veins very prominent on the under surface, depressed above, making the leaf very wrinkled, the larger ones radiating from the petiole, pale silvery-green, downy above, very cottony beneath. Flowers sessile, few, crowded, small, forming small, very dense, rounded whorls in the axils of the upper leaves, bracts linear, woolly. Calyx tubular, oblong, cylindrical, faintly 10-ribbed, woolly externally with stellate hairs, with 10 spreading, spinous, fringed, rather short teeth, hooked at the ends, the 5 alternate ones shorter, the throat with a ring of long hairs inside. Corolla slightly exceeding calyx, with a slender tube, bilabiate, the upper lip longer than the lower, narrow, oblong, deeply bifid, the lower 3-fid, white, glabrous. Stamens 4, inserted about midway in the tube and included in it, anther-cells confluent by their apices. Style bifid, branches very short. Achenes dark brown, blunt.

Habitat. — This plant grows in waste ground throughout

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* *Marrubium*, the classical Latin name.

Europe (except the extreme north), the Mediterranean district and Western Asia as far as India; in N. America it is introduced. The Horehound is not common in England, and is most frequently met with in the southern counties in dry chalky or sandy soil; it is supposed by some writers not to be a native British plant, and is no doubt often an outcast from gardens, where it is frequently cultivated. It flowers in the autumn.

Syme, E. Bot., vii, p. 51; Hook. f., Stud. Fl., p. 288; Watson, Comp. Cyb. Brit., p. 277; Gren. & Godr., Fl. France, ii, p. 699; Benth., in DC. Prod., xii, p. 453; Lindl., Fl. Med., p. 494.

Official Part and Name.—MARRUBIUM, *Horehound;* the leaves and tops (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India. It was, however, formerly official in the Pharmacopœias of this country.

General Characters and Composition.—The whole herb, which is commonly known under the name of *horehound*, is used in medicine. In a fresh state it has a strong, peculiar, aromatic, and rather agreeable odour; but this is diminished by drying, and when long kept is completely lost. The taste is bitter, penetrating, and permanent. Its bitterness is extracted both by water and alcohol.

Its essential constituents are a *volatile oil*, and a *bitter principle;* but it also contains *resin*, *tannic acid*, and *lignin*. Its infusion is reddened by litmus, and the addition to it of a persalt of iron causes a deep olive-green precipitate.

Medical Properties and Uses. — Horehound possesses tonic, aromatic, stimulant, expectorant, diaphoretic, and diuretic properties; it is also laxative in large doses, and was formerly regarded as emmenagogue. It is now but very rarely used by medical practitioners, but it was formerly much esteemed in various uterine, visceral, and hepatic affections; and in phthisis. Dr. A. T. Thompson states, that he has seen much benefit produced by it in catarrh in which there is much cough, with copious excretion of mucus, nocturnal sweats, and great prostration of strength. He speaks also of its value in phthisis. As a

domestic remedy, and more especially by the poor, it is still a good deal employed in chronic pulmonary complaints, especially catarrh, attended with cough and copious expectoration. A common form of administration is *horehound tea,* prepared by infusing one ounce of the herb in a pint of boiling water, and of which a wine-glassful is taken as a dose, two or three times a day. The medicine is also much used in form of syrup of horehound and candied horehound.

Steph. & Church., Med. Bot., by Burnett, vol. iii, pl. 135; Per. Mat. Med., vol. ii, pt. 1, p. 521; U. S. Disp., by W. & B., p. 552; Cyc. Pract. Med., vol. ii, p. 126.

DESCRIPTION OF PLATE.

Drawn from a plant collected near Sevenoaks, Kent, flowering in August.

1. Base of the plant.
2. A branch with flowers.
3. A flower.
4. Calyx.
5. Corolla, slit open.
6. Pistil.

(3–6 enlarged.)

D.Blair F.L.S. ad sicc. del. et lith.

M & N Hanhart imp.

PLANTAGO ISPAGHULA, *Roxb.*

N. Ord. PLANTAGINEÆ. Lindl., Veg. King., p. 502; Le Maout and Dec., p. 623.

Genus Plantago,* *Linn.* B. & H., Gen., ii, p. 1224. Species over 100, natives of all parts of the globe.

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211. Plantago Ispaghula,† *Roxb., in Asiatic Researches,* xi, *p.* 174 (1810).

Not previously figured.

Description.—Annual. Stem short, erect, or ascending, striate, woolly. Leaves alternate, sessile, somewhat dilated and amplexicaul at the base, 6—9 inches long, lanceolate-linear, attenuated, acute, erect, usually entire, sometimes remotely denticulate, sparsely clothed on both surfaces with long woolly hairs, 3-nerved. Flowers small, sessile, crowded and imbricated and forming short, dense, blunt, cylindrical, ovate-oblong spikes, about 1 inch long, at the extremities of long, cylindrical, erect, woolly peduncles (scapes), coming off singly from the axils of the leaves which they about equal in length; bracts large, broadly ovate, obtuse, concave, one beneath each flower, membranous, with a green keel. Sepals 4, oblong-oval, blunt, thin, with broad membranous margins, imbricate. Corolla gamopetalous, papery, persistent, tube a little longer than the sepals, somewhat gibbous, segments 4, rotundato-ovate, mucronulate, imbricate, spreading. Stamens 4, alternate with the corolla-lobes, much exserted, filaments long, very delicate, flexuous, anthers large, oblong, 2-celled, versatile, dehiscing longitudinally. Ovary superior, smooth, 2-celled, with a single ovule in each cell, style slender, exserted, stigma clavate, villous. Fruit ovoid, very small, pericarp membranaceous, dehiscent circularly near the base, 2-celled. Seeds solitary in each cell, attached horizontally to the centre of the axis, small, about $\frac{1}{10}$ inch long, boat-shaped, oval in outline, convex on the

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* *Plantago*, a name applied by Pliny to several plants, the common Plantain (*P. major*) being one.

† *Ispaghúl* is the Sanskrit name for the seeds, by which they are still generally known in Bengal.

back, concave or excavated on the ventral surface, which is marked in the centre by the double hilum, pale-brownish-grey, testa thick, transparent, allowing the embryo to show through as an orange mark on the back, embryo straight in the axis of the softly horny endosperm, dark coloured, cotyledons narrow, radicle inferior.

Habitat.—This little plant is found wild in north-western India, being common in the Punjab and Valley of Peshawar; it is also cultivated during the cool season in several parts of India, as Multan, Lahore, and the Coromandel Coast.

It is probably correct to consider *P. Ispaghula* as a form of the variable and widely diffused *P. decumbens,* Forsk., which is found in the Canaries, Egypt, from Arabia to Persia, and north-western India; this is usually a plant of smaller size than *P. Ispaghula,* and the latter may be merely a cultivated race.

The specific name is spelt *Ispaghul* in the 'Asiatic Researches,' but *Ispaghula* in the later 'Flora Indica;' the latter form is that generally adopted.

Roxb., Fl. Indica, i, p. 404; Decaisne, in DC. Prod., xiii, pt. i, p. 706; Lindl., Fl. Medica, p. 473; Flück. & Hanb., Pharmacogr., p. 440.

Official Part and Name.—Ispaghulæ Semina; the seeds (I. P.). They are not official in the British Pharmacopœia, or the Pharmacopœia of the United States.

General Characters and Composition.—These seeds are commonly known in India, by the Persian word *Ispaghúl;* they are also termed *Spogel seeds.* They are boat-shaped in form, being concave on one side and convex on the other; about the eighth of an inch in length, and about half as broad; and very light in weight, so that according to Flückiger and Hanbury, one hundred seeds scarcely weigh three grains. They have a greyish colour tinged with pink, and are marked on the convex surface by a lengthened brownish-yellow spot. Spogel seeds have neither odour nor taste, but when chewed they are very mucilaginous.

When immersed in water they yield *mucilage* in such abund-

ance that in the proportion of one part of the seeds to twenty parts of water a thick jelly is formed. Flückiger and Hanbury state that the mucilage is "not contained within the cells, but is formed of the secondary deposits on their walls, as in linseed and quince pips." They also describe it when separated by straining with pressure, as "not affected by iodine, nor precipitated by borax, alcohol, or ferric chloride." This mucilage is the essential constituent of the seeds. A *fat oil* and *albuminous matter* have also been found in spogel seeds, but nothing definite is known respecting these substances.

Substitutions.—The seeds of other species of *Plantago*, as those of *P. amplexicaulis*, Cav., *P. ciliata*, Desf., and others, are said by Dr. Stewart, to be sold in the Indian bazaars, under the same names as the official seeds; they have similar properties. The European species *Plantago Psyllium*, L., and *P. Cynops*, L., have also been employed for like purposes from an early period.

Medical Properties and Uses.—Ispaghúl seeds have long been highly valued in India and other parts of the East for their cooling and demulcent properties, and are worthy of a trial in this country. Ainslie says, they are much prized by the native practitioners in India, who prescribe them in the form of an infusion in gonorrhœa, catarrh, and renal affections. But their chief use, according to Waring and others, is in diarrhœa and dysentery, in which cases they may be employed whether fever be present or not. "In the early stages of these diseases they are best given in decoction prepared by boiling four drachms of the bruised seeds in two pints of water, till the quantity is reduced to one pint, and straining. The whole of this may be taken, in divided doses, in the course of the day. It need not interfere with the use of opium, or any other remedies deemed necessary. In chronic diarrhœa they are best given whole, in doses of two drachms and a half, mixed with half a drachm of sugar candy or sugar. They are chiefly useful when the stools are very watery. A low diet and small doses of opium aid their operation." Twining says that a slight degree of astringency and some tonic property may be imparted to the seeds by

exposing them to a moderate degree of heat, so that they shall be dried and slightly browned; and he adds, "that this remedy sometimes cures the protracted diarrhœa of European and native children after many other remedies have failed."

The bruised seeds when moistened with water are also described as forming a good emollient poultice.

Waring's Pharmacopœia of India, p. 182; Fleming's Catalogue of Ind. Med. Plants and Drugs, Calcutta, 1810, p. 31; Pharmacographia, p. 440; Twining's Diseases of Bengal, vol. i, p. 212; Cooke, in Pharm. Journ., ser. 3, vol. i, p. 86; Proc. Amer. Pharm. Assoc. (1873), p. 213, and Dragendorff, in N. Rep. Ph., 1872, p. 519.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in the Punjab by Drs. Hooker and Thomson.

1. A flowering specimen.
2. Bracts.
3. A flower.
4. Vertical section of the same.
5. A sepal.
6. Corolla.
7. Vertical and—8. Transverse section of ovary.
9. Seeds.
10. Dorsal, and 11. Vertical view of a seed.
12. The same with the testa partially removed, showing the embryo.
13. Transverse section of the same.

(2–8, 10–13 enlarged.)

D Blair ad nat del. et lith.

M & N Hanhart imp

POLYGONUM BISTORTA, *Linn.*

N. Ord. Polygonaceæ. Lindl., Veg. K., p. 642; Le Maout & Dec., p. 631.

Tribe *Polygoneæ*.

Genus Polygonum,* *Linn.* Meisner, in DC. Prod., xiv, pp. 83–143. Species 215, natives of all parts of the globe.

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212. Polygonum Bistorta,† *Linn., Sp. Pl., ed.* 1, *p.* 360 (1753).

Bistort. Snake-weed.

Figures.—Woodville, t. 232; Hayne, v, t. 19; Steph. & Ch., t. 48; Nees, t. 105; Curt., Fl. Londin., fasc. i; Syme, E. Bot., viii, t. 1243.

Description.—An herbaceous perennial. Root-stock cylindrical, woody, about as thick as a finger, widely creeping, much branched, ridged with leaf-scars on the outside, brownish, pale red within, giving off numerous fibrous roots, usually twisted into an S-shape, branches ending in tubers. Stems erect, quite simple, 1½—2 ft. high, cylindrical, smooth, striate, slightly thickened at the nodes. Radical leaves large, on long stalks, ovate, acute, abruptly constricted at the base and then attenuated into the petiole, margin entire, somewhat undulated; stem-leaves few, alternate, rapidly decreasing in size upwards, blade narrowly ovate, acute, sessile or nearly so, the petiole forming a long tubular sheath round the stem, continued above (for an inch above the blade in the lower leaf) into a scarious entire stipular appendage (ocrea); all dark green above, glaucous and pubescent on the prominent veins beneath. Flowers arranged in pairs, each couple surrounded at the base by two scarious cuspidate bracts, stalked, articulated to the summit of the smooth slender pedicels, and readily separating from them, one of the two expanding much before the other; clusters very densely crowded on the upper part of the stem, where they form a solid, cylindrical, oblong, blunt, erect in-

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* Name from πολύς, many, and γόνυ, a knee or knot, from the numerous nodes in some species.

† *Bistoria*, the mediæval name, from the twice-twisted root-stock.

florescence, 1—2 inches long. Perianth about $\frac{1}{8}$ inch long, tubular, compressed antero-posteriorly, of 5 oval, obtuse, pale pink, smooth leaves, slightly connected at the base, imbricate, two exterior. Stamens 8, hypogynous, but attached to the base of the perianth, placed 3 opposite two of the inner perianth leaves, 2 opposite the other, those opposite the centre of each of the 3 inner perianth leaves inserted by a broad, flattened, red base adherent for some distance up, much exserted; filaments slender, white; anthers small, versatile, purple. Ovary very small, trigonous; styles 3, distinct, filiform, shorter that the stamens. Fruit a small, indehiscent, triquetrous, dark-brown, shining, pointed nut, a little exceeding the withered perianth, and containing a single erect seed. Seed completely filling the fruit; embryo lateral, curved; radicle superior; endosperm mealy.

Habitat.—This is a well-known plant, though scarcely common, in moist or swampy meadows and on the borders of damp woods, throughout Great Britain, but is thought to be introduced in many localities. When once established it is with great difficulty eradicated, the leaves frequently forming large patches year after year without any flowering-stems being sent up. The Bistort has a wide range throughout the Northern Hemisphere, reaching from the arctic regions of Europe, Asia, and America to South Europe, the Himalayas and Canada. Arctic specimens only 4 or 5 inches high.

Meisner, l. c., p. 125; Hook. f., Stud. Fl., p. 307; Syme, E. Bot., viii, p. 78; Wats., Comp. Cyb. Br., p. 298; Ledebour, Fl. Ross., iii, p. 518; Hook., Fl. Bor.-Amer., ii, p. 130; Lindl., Fl. Med., p. 361.

Part Used and Name.—Bistortæ Radix; the dried rhizome or root. It is not official in the British Pharmacopœia, or the Pharmacopœia of India, or the Pharmacopœia of the United States. But it was formerly official in the Dublin Pharmacopœia.

General Characters and Composition.—Bistort root, or more properly Bistort rhizome, derives its name from being commonly twice folded or twisted on itself, and hence this character is one of its most marked peculiarities. It is cylindrical, somewhat flat-

tened, usually about the thickness of the little finger, and marked externally with transverse or annular wrinkles, which give it a roughish appearance. It has a hard firm texture, a deep reddish-brown colour externally, and a reddish or flesh-colour internally; it is without odour, but with a strong, pure, astringent taste.

Bistort root has never been carefully analysed, but its principal constituents are *tannic acid*, of which it contains a large quantity, some *gallic acid*, and much *starch*. Its virtues are extracted by water, and its decoction becomes inky-black on the addition of a persalt of iron, and with gelatine it forms a precipitate.

Medical Properties and Uses.—It is one of the most powerful of our indigenous astringents, although now but very rarely employed, its use having been superseded by catechu, kino, and other astringents of foreign origin. A decoction is, however, sometimes used as an astringent injection in leucorrhœa and gleet; as a gargle in spongy gums and relaxed sore throat; and as a lotion to ulcers attended with a profuse discharge. It has been highly recommended by Cullen for internal use in combination with gentian in intermittents, and it has also been employed in passive hæmorrhages and chronic alvine fluxes. Formerly it was much esteemed, as is shown by the following extract from Gerarde's Herbal:—"The juice of Bistort, put into the nose, prevaileth much against the disease called Polypus. . . The root boyled in wine, and drunke, stoppeth the bloudy flix; it stayeth also the ouermuch flowing of women's monethly sicknesses. The roote taken as aforesaid staieth vomiting, and healeth the inflammation and sorenesse of the mouth and throat; it likewise fastneth loose teeth, being holden in the mouth for a certaine space and at sundry times."

The large quantity of starch which the root contains also renders it nutritive; and hence when roasted it is eaten in Siberia and Iceland. According to Curtis and Withering, the shoots and leaves were used about Manchester, for greens, under the name of Patience Dock. It is probable, however, that the name Patience Dock has been incorrectly applied to this plant from its having been confounded with the true Patience Dock (*Rumex Patientia*),

which was formerly cultivated in this country, and eaten as a pot-herb. But since the time of Gerarde, the young shoots and leaves of Bistort have been used in the North of England as a pot-herb under the name of Passions; which name is probably derived from the plant being in perfection for such a purpose about Easter. Miller also says, "The young shoots are eaten in herb puddings in the North of England, where the plant is known by the name of Easter Giant."

Per. Mat. Med., vol. ii, pt. 1, p. 503; Gerarde's Herball, by Johnson, 1636, p. 399; Steph. and Church., Med. Bot., by Burnett, vol. i, pl. 48; Lewis, Mat. Med., p. 154; Cullen's Mat. Med., vol. ii, p. 40; Miller's Gard. Dict., by Martyn (1807), vol. 2, pt. 1.

DESCRIPTION OF PLATE.

Drawn from a plant grown in Kew Gardens.

1, 2, 3. The whole flowering stem and root-stock.
4. Diagram of flower.
5. A flower.
6. Vertical section of the same.
7. A fruit.
8. Vertical, and—9. Transverse section of the same.

(5—9 enlarged.)

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D.Blair, F.L.S. ad nat. del et lith

M & N Hanhart imp.

RHEUM OFFICINALE, *Baill.*

N. Ord. Polygonaceæ.

Tribe *Rhabarbareæ*.

Genus Rheum,* *Linn.* Meisner, in DC. Prod., xiv, pp. 32—37. Species 20 or more, natives of Northern Asia, China, Persia, and the Himalayas.

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213. Rheum officinale, *Baillon in Adansonia*, x, *p.* 246 (1872).

Thibetan Rhubarb.

Figures.—Rep. de l'Association Française, 1872, t. 10, reprod. in Adansonia, xi, tt. 8, 9; Bot. Mag., t. 6135 (Dec., 1874); Neues Repert. für Pharmacie, xxv (1876).

Description.—A large, perennial, herbaceous or semi-fruticose plant, possessing after the first two or three years of its life (according to Baillon) a very thick aërial stem persisting through the winter, with branches about 10—16 inches long, as thick as a man's thigh, suddenly tapering to a blunt apex and covered externally with a dark brown coat formed of the dried and withered, closely-placed leaf-bases and ocreas of former years, many of which have leaf-buds in their axils, internally fleshy or semi-pulpy, with a yellowish or orange-coloured juice; the lower part of the stem giving off large, thick, adventitious roots. Lower leaves very large, closely placed, alternate, on very long petioles, stipulate, spreading on all sides, at first reddish; petioles about 18 inches long, widely dilated at the base, nearly cylindrical above, about 1½ inch thick, solid, perfectly glabrous or pubescent with very short white hairs, longitudinally striate, bright green; stipules (ocreæ) very large, membranous, at first obovoid, entire, afterwards orange-brown and torn; blade from 2—4½ feet long, and somewhat more wide, suborbicular, palmately-veined, with 5—7 nearly equal, shallow lobes, base cordate or reniform, margin irregularly and coarsely cut, veins thick, very prominent beneath, much reticulated, upper surface smooth, pale clear green, under surface paler, covered with a fine white pubescence; upper leaves few, distant on the

* *Rheum*, in Greek ῥῆον or ῥᾶ, was the name of the drug in classical times.

flowering-branches, shortly stalked or nearly sessile, very much smaller, somewhat triangular, more deeply cut. Flowering-branches several, reaching a height of 5—8 feet or more, hollow, green, thick, striate, nearly smooth, terminating in the much-branched inflorescence. Flowers small, about $\frac{1}{4}$ of an inch long, on slender drooping pedicels somewhat exceeding them in length, which are thickened at the end and have an articulation a little below the middle, arranged in clusters of 7—10, with a single, small, orange-coloured bract at the base; clusters densely crowded on all sides of the axis, and together forming a stalked, cylindrical, drooping, catkin-like inflorescence, tapering to a point; these terminate the divaricate cylindrical branchlets of the flowering-stems and the whole forms an elegant pyramidal head or compound panicle; branches of the inflorescence striate, densely pilose, with crowded short hairs on the ribs, buds globular; larger bracts early deciduous. Perianth-leaves 6, hypogynous, obovate-oblong, blunt, nearly glabrous, very slightly connected below, pale greenish-white with whiter borders, imbricate in two rows, nearly equal, the 3 inner somewhat longer, concave, never spreading. Stamens 9, hypogynous, about as long as the perianth, 3 opposite each of the inner perianth-leaves, the central one of each 3 somewhat longer than the others, and apparently forming an inner row, anthers ovate-oblong, innate, pale lemon-yellow. Disk large and prominent, surrounding the base of the ovary, consisting of 9 fleshy, blunt, bright and shining, dark green lobes alternating with the stamens, distinct or variously united; ovary not half the length of the stamens, 3-sided, tapering, smooth, pale green, 1-celled; styles 3, spreading or reflexed; stigma large, capitate, reflexed over the edges of the ovary, pink. Fruit in small clusters, about $\frac{1}{2}$ an inch long by somewhat over $\frac{1}{4}$ of an inch broad, pendulous, on stalks about $\frac{2}{3}$ their length which disarticulate below the middle, surrounded at the base by the persistent, slightly enlarged, purplish perianth-leaves, triangular in section and tapering, but with a large wing at each angle much wider at the apex than the base, so that the shape of each face is broadly oblong; wing cordate at the base and apex,

brilliant crimson-red, with many close transverse veins and a strong longitudinal intramarginal rib; pericarp very thin, papery, transparent, yellow, with two large channels or vittæ along the centre of each side filled with a dark yellow liquid with a resinous odour and staining properties. Seed solitary, erect, testa exceedingly thin, united with the pericarp; embryo small, with a superior radicle and oval cotyledons, lying in the axis of the dense, tough but milky endosperm.

Habitat.—All that is certainly known about this fine species of *Rheum*, which no doubt is the source of at least a portion of the Rhubarb of commerce, is that in 1867 the "Société d'Acclimatation" at Paris received from M. Dabry, French Consul, a large consignment of roots professing to be those of the true official Rhubarb. They had come to him through a missionary at Set-chuan, who probably had obtained them from a Chinese, and there is no doubt that they were collected in the south-eastern part of Thibet near the Chinese frontier. The plant is said to grow wild and also to be cultivated there, and it probably extends into China itself, but whether it grows in the districts, Sui-tschuan, Schensi, and Kansu, from which the best rhubarb is now obtained, is not known. The whole on its arrival at Paris appeared to be one putrifying mass, but by a piece of good fortune a few of the globular axillary buds retained sufficient vitality when placed under favorable conditions to put out adventitious roots, and ultimately a plant was raised. Of this after some years' cultivation in the botanic garden of the Faculty of Medicine in Paris, M. Baillon, in 1872, gave a full description and from this source all the plants now existing in Europe have been derived.

In this country it was first grown in 1873, by the late D. Hanbury, who also sent specimens to Mr. Usher, of Banbury (who commenced the cultivation of the plant for medicinal use), to Kew, and to other gardens. These flowered in 1874, and since then it has been to some extent grown as an ornamental plant, and from its extremely handsome character will, no doubt, as it is quite hardy and readily propagated, become common in gardens.

It flowers in May and June, and the fruit is ripe at the end of July.

As a species this is very distinct from the rest of the genus, *R. palmatum* being its nearest ally. From *R. hybridum*, Murr., it is quite different. The form of the leaves is very characteristic, and unlike any other species, these are very handsome, and when young somewhat remind one of the castor-oil plant; the petiole is completely without any groove on the upper surface, and the exterior border of the two lowest ribs is entirely bare for some distance from the petiole. The figure of the fruit in the 'Bot. Magazine' is incorrect both in form and colour.

In the above description of the stem Baillon's full account has been followed. He has had the opportunity of examining plants of greater age than any yet grown here. The latter have not developed any decidedly aërial stem, nothing more than a crown of a few inches high. Mr. Usher, after three years' cultivation, has not observed any tendency towards the formation of a further stem, though the increase in bulk of the little offset he received in 1873, of about an inch in diameter, was very great, the central portion attaining a weight of 13 pounds. We are indebted to him for a specimen of the root prepared for the market, and we agree with Prof. Flückiger, of Strasburg, who has also examined a similar specimen and himself grown the plant at Strasburg, that it possesses the appearance of the true Rhubarb, especially in the presence of the zone of numerous star-like spots formed by the fibro-vascular bundles. Further cultivation will show whether the stem becomes as much developed as is described by Baillon, or whether it be anything more than a large root-stock which from its vigorous growth is somewhat more elevated above the surface of the ground than in other species.

Baillon, in Rep. de Congrès (Association Française) de Bordeaux, 1872, pp. 514—549, abstracted in Journ. Bot., 1872, p. 379, & reprinted in Adansonia, xi, p. 219; Flückiger, in Neues Repert. für Pharmacie, bd. xxv, heft 1, p. 1 (1876), abstracted in Pharm. Journ., 1876, p. 861; Journ. Bot., 1875, p. 239.

Official Part and Names.—Rhei Radix; the dried root deprived of the bark, from one or more undetermined species of Rheum, *Linn.* (B. P.). The dried decorticated root (I. P.). Rheum; the root of *Rheum palmatum*, and other species of Rheum, from China, Chinese Tartary, and Thibet (U. S. P.).

It will be seen from our botanical description, and also from the above extracts from the British Pharmacopœia, and the Pharmacopœias of India and the United States, that the botanical source of the official rhubarb is not yet absolutely proved, although it seems clear that it is derived, in part at least, from this species; hence all particulars as to the Collection, Commerce, General Characters, Composition, Medical Properties, and Uses of this drug, are reserved by us until we treat of *Rheum palmatum*, which the more reliable information of former writers, as well as the recent travels of Lieut.-Colonel N. Prejevalsky in Mongolia, prove to be another source of Chinese rhubarb, and probably that from which our best commercial specimens are derived. But that *Rheum officinale* does also yield a kind of rhubarb having some of the marked characters of true Chinese rhubarb we have proved by the examination of a specimen of the root of this plant cultivated in this country by Mr. Usher, of Bodicott, near Banbury. The characters of this rhubarb are more fully described under *Rheum palmatum*.

Pharmacographia, p. 442; Per. Mat. Med., by B. & R., p. 568; Pharm. Journ., vol. iii, ser. 3, p. 301; L'Union Pharmaceutique, vol. xv, p. 21; Pharm. Journ., vol. iv, ser. 3, p. 690, and vol. vi, p. 861.

DESCRIPTION OF PLATE.

Drawn from a plant in Kew Gardens, flowering in May; the fruit from a plant in the garden of the Royal Botanic Society, Regent's Park.

1. A plant in flower (about $\frac{1}{10}$ nat. size). 2. Portion of the inflorescence. 3. A flower. 4. Vertical section of the same. 5. Diagram of the same. 6. A spike of ripe fruit. 7. A single fruit. 8. Vertical, and—9. Transverse section of the same.

(3—5 and 7—9 enlarged.)

RHEUM PALMATUM, Linn.

N. Ord. Polygonaceæ.
Tribe *Rhabarbareæ*.
Genus Rheum, *Linn.*

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214. Rheum palmatum, *Linn., Sp. Plant., ed.* 2, *p.* 531 (1762).

Shara-moto (Mongolia). *Djumtsa* (Tangut). *Kiachta Rhubarb.*

Figures.—Linn., Plant. Rar. Hort. Upsal., fasc. i, t. 4; Woodville, t. 231; Steph. & Ch., t. 25; Nees, tt. 118–120; Hayne, xii, t. 10; Pallas, Fl. Rossica, ii, tt. 22, 23; Philosophical Transactions, iv, tt. 12, 13, cop. in Regel, Garten-flora, Jan., 1875, and Prejevalsky, Mongolia, ii.

Description.—A large perennial herb. Root with a vertical axis about a foot long and equally thick, cylindrical, covered with a dark brown rough rind, and with many slender branches reaching 2 feet in length. Flowering-stem 7—10 feet in height, cylindrical, smooth, striate, 1—1½ inch in diameter, hollow, pale green, strongly tinged with red. Root-leaves several, large, on petioles which are 1 to 2 feet long, oval or subcylindrical in section and nearly flat above, smooth or covered with fine reddish hairs, blade broadly ovate or suborbicular in outline, 2 to 3 feet wide, cordate at the base, palmately 3—5 veined, with the basal nerves bare below for a short distance near the petiole, deeply divided into 5 lobes which are again cut into many unequal, attenuated very acute segments, with entire margins, both surfaces slightly rough with a covering of very short bristly hairs, bright green above, pale beneath, ocreæ very large, dark brown, becoming torn and reflexed; stem-leaves few, less deeply lobed, less cordate at the base, becoming smaller upwards, the uppermost reduced to their sheathing ocreæ. Flowers small, very numerous, on very slender spreading pedicels scarcely exceeding the length of the flowers, and articulated below the middle third, arranged in irregular clusters of 2 or 3 together on the slender, strongly pubescent, spreading or ascending branchlets of the panicle, several of which come off together in tufts at each joint; the

whole forming a very large, elongated, somewhat narrow inflorescence. Perianth as in *R. Rhaponticum*, but rather smaller and tinged with pink or flesh-colour, persistent. Stamens and pistil as in that species. Fruit about $\frac{3}{8}$ inch long, triangular in section, with a thin papery wing from each angle, the sides broadly oval or oblong-oval, about $\frac{1}{2}$ inch wide in the middle, wing about as wide as the fruit, marked with numerous close parallel transverse veinlets and a marginal nerve running parallel and close to the edge. Seed as in the other species.

Habitat.—This plant was first made known by David De Gorter, physician to the Russian Court, who about 1750 procured seeds from a rhubarb merchant and grew them. He sent specimens to Linnæus, who in 1762 described and named them in his "Species Plantarum," giving as the habitat "China ad murem." In the following year, 1763, seeds were sent from Russia to England by Dr. Mounsey and plants were grown at Edinburgh and Cambridge, and in 1765 Dr. Hope published a full discription with figures of a plant which flowered in the Edinburgh garden in that year. At Upsal, cultivation from seed was not successful, but a root sent from De Gorter flowered, and enabled Linnæus in 1767 to give a figure of the species. At this time it was considered to be with certainty the source of the best Russian rhubarb, and the descendants of the specimens above mentioned have been grown in botanic gardens up to the present time. No one had, however, collected the plant in its native localities, and the claims of other species, especially *R. australe*, Hayne, and *R. compactum*, and more recently of *R. officinale*, to be the source of the drug have been strongly advanced. It was not, indeed, till 1872-3 that *R. palmatum* was found wild, when Col. Prejevalsky collected it, as the source of the real Kiachta rhubarb, in the Tangut district of Kansu, the extreme north-western province of China, which had been long known to be the country where the root was procured. The plant grows here on rich soil in the forest- or tree-belt at an elevation of about 10,000 feet, principally on the shady sides of damp ravines with a north aspect. It extends over a considerable tract of country round the

Kokonor Lake, abounding near the sources of the Tatung and Etsima rivers, the mountains sonth of the lake, the snowy range south of Sining and in the Yegrai-ula near the source of the Yellow River. Near Chertinton it is rare, and it does not occnr in the adjacent northern parts of Thibet. It is rarely cultivated, though occasionally grown in gardens about houses. The plant is in flower in June and the fruit is ripe at the end of August. Prejevalsky brought roots, seeds, and dried specimens to St. Petersburgh, and Prof. Maximovicz states that the root perfectly agrees with the best specimens of rhubarb, which, according to him, there can be no doubt is derived from this species.

We are indebted to Prof. Maximovicz for specimens of the Tangut plant collected by the Russian traveller (which was in fruit), and these present some differences as compared with the old inhabitant of our gardens. The panicle of the wild plant is much larger and the branches more upright and more pubescent; the flower stalks are more swollen upwards and the fruit is rather larger; but these differences are slight and probably due to the long cultivation of the garden plant.

R. palmatum is not now grown for medicinal use; young plants may be seen at Chelsea and the Botanic Society's Gardens; but it is the least easily cultivated of the rhubarbs, the main root being very liable to rot; we have been unable to obtain a living flowering specimen.

Hope, in Phil. Trans., iv, p. 290 (1765); J. A. Murray, Apparatus Medicaminum, iv, p. 362 (1787); Woodville, Med. Bot., ed. 1, p. 127; Meisner, in DC. Prod., xiv, p. 32; Maximovicz, in Regel, Garten-flora. Jan., 1875, translated in Prejevalsky's Mongolia (English edition), ii, p. 291; ibid., ii, p. 81; Lindl., Fl. Med., p. 358.

Official Part and Names.—Rhei Radix; the dried root deprived of the bark, from one or more undetermined species of Rheum, *Linn.* (B. P.). The dried decorticated root (I. P.). Rheum; the root of Rheum palmatum, and of other species of Rheum, from China, Chinese Tartary, and Thibet (U. S. P.).

Production, Preparation, and Commerce.—Rhubarb is produced

over an immense tract of country in the Chinese Empire; but the true rhubarb, namely, that purchased for the European market, appears to be exclusively derived from the provinces of Szechuen, Shensi, and Kansu; and from the recent travels of Lieutenant-Colonel Prejevalsky it would seem clear that *Rheum palmatum* is its botanical source. Prejevalsky also states that in the mountainous districts of Tangut, near the salt lake of Koko-nor in the province of Kansu, rhubarb is principally obtained from the wild plant, although it is cultivated to some extent. The statement of Von Richthofen, which is given by him in an account of a journey from Pekin to Szechuen, is also to the effect that the best sorts are obtained from wild plants. But little is known in reference to the preparation of rhubarb for the market; Prejevalsky states that the Tangutans and Chinese dig the root up in September and October; they then cut off the lateral offsets and remove the outer rind from the root, which is then cut into pieces; these are afterwards threaded on strings and suspended in the shade to dry, generally under the roof of a house, where the air circulates freely. The root is regarded in a mature state at from eight to ten years old. It is said that in Szechuen the roots are obliged to be dried in the sun, and as a consequence, they are not like those of Kansu, of firm substance throughout. In other districts they are stated to be dried by artificial heat; or the roots are dug up, cleansed, cut in pieces, and dried on stone tables heated beneath by a fire, being frequently turned during the process. They are afterwards pierced, strung upon cords, and further dried in the sun. The rhubarb prepared in the province of Kansu is transported to Si-ning or Sining-fu, and that obtained in Szechuen to Kwanheim. These are the two principal markets for rhubarb, but according to Consul Hughes, of Hankow, it appears that San-yuan in Shensi is also one of the principal marts for rhubarb. That which comes from Sining is known as Shensi rhubarb, and fetches the highest price. From these depôts the rhubarb now finds its way chiefly to the City of Hankow on the Upper Yangtze, where it is purchased for the European market. Formerly, as stated by Prejevalsky, a large

quantity of rhubarb was sent from Sining to Europe by way of Kiachta, but of late years this source of supply has ceased. As the botanical source of this rhubarb has been thus distinctly traced to *Rheum palmatum*, it seems clear that this species is that from which the formerly much appreciated Russian or Turkey Rhubarb was derived. From Hankow it is sent down to Shanghai, from whence it is shipped to Europe. Much smaller quantities are exported to Europe from Tientsin and occasionally some is shipped from Canton, Amoy, and Foochow. The whole quantity sent from Hankow to Shanghai annually, averages about 625,000lbs, and the import of rhubarb into the United Kingdom is roughly estimated at about 350,000lbs annually.

General Characters.—The rhubarb which is exported from China varies considerably in form, structure, and appearance, arising, in a great measure, from the different modes of paring, slicing, trimming, and drying, to which the roots have been subjected in preparing them for the market; but also, we believe, from being derived from different species, for although, as we have stated, *Rheum palmatum* appears to be the botanical source of the best rhubarb, namely, that which formerly came to us by way of Kiachta, and which was known as Russian Rhubarb, a careful inspection of late years of the rhubarbs imported from Shanghai, Canton, and other ports of China, has convinced us that they cannot be all derived from one species.

China rhubarb varies much in form, being rounded, somewhat cylindrical or more properly barrel-shaped, conical, plano-convex, or more or less angular and irregular. These various forms are commonly distinguished in commerce as *flats* and *rounds*, and are usually contained in different packages. The pieces ordinarily are three or four inches long, and two or three inches broad, but both smaller and larger pieces may be not unfrequently found. The outer surface is either rounded or marked with flat surfaces and angles; it is usually more or less shrivelled, and frequently presents portions of dark-coloured bark. Many of the pieces have a hole extending through them in which commonly the remains of the cord used to suspend them to dry may be found; but in some the cord has

been removed. The surface is covered over with a bright yellowish-brown powder, beneath which the drug is seen to be marked by reddish or rusty-brown lines intermixed in a yellowish-white substance; and commonly scattered over the surface we may observe small star-like spots, the whole presenting a somewhat marbled appearance. When broken transversely the pieces show the same marbled appearance; and some pieces exhibit an internal ring of star-like spots. In reference to this latter marking, the authors of Pharmacographia remark, "Although this character is by no means obvious in every piece of Chinese rhubarb, it is of some utility from the fact that in European rhubarb such spots are generally wholly wanting, or at most occur only sparingly and in an isolated manner." Some specimens of English rhubarb, however, that we have recently examined, show a similar ring of star-like spots. When of good quality, the fractured surface of rhubarb should be compact, free from decay and discoloration, and marbled throughout its whole substance with reddish-brown lines interrupted with yellowish-white matter. Rhubarb has a strong, peculiar, and faintly aromatic odour, and a bitter, somewhat astringent, and nauseous taste, and when chewed it feels gritty under the teeth, from the presence of numerous crystals of oxalate of calcium.

The characters of rhubarb root are given in the British Pharmacopœia as follows: "Trapezoidal roundish or cylindrical flattish pieces, frequently bored with one hole, yellow externally, internally marbled with fine wavy greyish and reddish lines, finely gritty under the teeth, taste bitter, faintly astringent and aromatic; odour peculiar. Free from decay, not worm-eaten. Boracic acid does not turn the yellow exterior brown."

Composition.—Rhubarb root has been frequently analysed, and a number of constituents have been indicated as occurring in it by those chemists by whom it has been examined, as Schlossberger and Döpping, De la Rue and Miller, Kubly, Buchheim, and many others. The more important constituents are *starch, oxalate of calcium, chrysophan* or *chrysophanic acid;* three resins, named *aporetin, phæoretin,* and *erythroretin;* and *emodin, rheo-tannic acid, rheumic acid,* and *pectic matter.* Rhubarb owes its grittiness when chewed,

and in a great measure its hardness and density, to its crystals of oxalate of calcium; and as these are commonly more abundant in China rhubarb than in that grown in England and other parts of Europe, the greater grittiness of the former is regarded as one means by which it may be distinguished from the latter. The yellow colour of rhubarb is essentially due to *chrysophanic acid* which crystallises in the form of golden-yellow needles or laminæ; these are readily soluble in alcohol, ether, or benzol, and in alkalies, but only slightly soluble in water. *Emodin* is also a crystalline substance of an orange colour; it resembles chrysophanic acid. *Rheo-tannic acid* is an abundant constituent; it is a yellowish-brown powder, soluble in water or alcohol, but not in ether.

Nothing of a positive nature is known as to which constituent the purgative property of the drug is due; or in what kind of pharmaceutical preparations its therapeutic action may be best exhibited. Chrysophanic acid, however, has been said to be its principal purgative constituent; but according to the recent experiments of Buchheim, which have been essentially confirmed by Kubly, the active principle of rhubarb is probably analogous to the cathartic acid of senna. Buchheim found chrysophanic acid to be entirely inactive, when taken by himself in doses of from about four to eight grains. He concludes, therefore, that the aqueous extract of rhubarb represents very completely the activity of the drug; and to this conclusion the testimony of most practical observers now tends.

Medical Properties and Uses.—In small doses rhubarb acts as a stomachic and slight astringent; and in large doses as a purgative. Its action as a purgative is mild, and it never irritates the alimentary canal. Under the use of rhubarb the secretions, particularly the urine, become coloured. The cutaneous secretion, especially of the arm-pits; and the milk also, become coloured under its use. From the above-mentioned properties of rhubarb it is a purgative of much value in diarrhœa depending on the presence of irritating matter in the alimentary canal, by first causing its evacuation, and afterwards acting as an astringent. As a purgative for children it is also largely employed, especially

when combined with magnesia or sulphate of potash; it is also frequently useful when given to scrofulous children in combination with calomel. When employed in cases of habitual constipation, its subsequent astringent action should be counteracted by combining it with soap, or with some other laxative. In dyspepsia accompanied with a debilitated condition of the digestive organs, small doses of rhubarb frequently prove beneficial.

Externally powdered rhubarb has been applied with good effect to indolent and sloughing ulcers.

Other Kinds of Rhubarb.—Various species of rhubarb are cultivated in different parts of Europe, &c., or are found in a wild state in other portions of the world; the roots of which are substituted for that now under description. These and all other matters connected with this drug are described by us under "Rheum officinale," and "Rheum Rhaponticum."

Per. Mat. Med., vol. ii, pt. 1, p. 483; Per. Mat. Med., by B. & R., p. 569; Pharmacographia, p. 446; U. S. Disp., by W. & B., p. 729; Prejevalsky, Travels in Mongolia, by Morgan, vol. ii, pp. 81 & 291; Pharm. Journ., ser. 1, vol. iv, pp. 136, 232, & 318, and vol. viii, p. 190; Pharm. Journ., ser. 1, vol. xvii, p. 576; Farre, in Pharm. Journ., ser. 2, vol. vii, p. 375; Kubly, Pharm. Zeitschrift f. Russland, vi (1867), and in Abstract in Wigger's & Husemann's Jahresbericht for 1867, p. 40; Vierteljahrschr. Ph., 1873, No. 3, pp. 357—359, and Proc. Amer. Pharm. Assoc., vol. xxii (1874), p. 104; Pharm. Journ., ser. 3, vol. iii, p. 301, vol. iv, p. 690, and vol. vi, p. 861; Gardeners' Chronicle, vol. iii, N. S. (1875), p. 399; L'Union Pharmaceutique, vol. xv, p. 21; Journ. Pharm. Chim., 4th ser., vol. xv, p. 275, and Year Book of Pharmacy (1872), p. 84.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected by Prejevalsky in Tangut, N. W. China; the flower added from Maximovicz; the sketch of the whole plant after Hope (slightly altered). 1. A lateral branch of the panicle, in fruit. 2. A flower. 3. A single fruit. 4. Vertical section of the same. 5. A whole plant (much reduced). (2–4 enlarged.)

RHEUM RHAPONTICUM, *Linn.*

N. Ord. Polygonaceæ.
Tribe *Rhabarbareæ*.
Genus Rheum, *Linn.*

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215. Rheum Rhaponticum,* *Linn., Sp. Plant., ed.* 1, *p.* 371 (1753).

English Rhubarb.

Syn.—R. sibiricum, *Pallas.*
Figures.—Hayne, xii, t. 7; Nees, tt. 113—115; Parkinson, Paradisus terrestris, p. 485.

Description.—A large perennial herb, with a solid, cylindrical, erect, many-headed rootstock, the central mass often 4 or 5 inches in diameter, the upper part clothed with the large, thin, dark brown, smooth, papery, persistent ocreæ, and the lower ringed with the scars of the leaves of previous years, or with their nearly black amplexicaul bases, with numerous buds in their axils; roots numerous, somewhat fasciculate, thick and fleshy, often with the central one largest, continued straight downwards from the base of the rootstock, and attaining a diameter of 2 inches, the others narrower, cylindrical or nearly so, very long, gradually tapering, very slightly branched, smooth but slightly wrinkled transversely, and marked with the scars of the rootlets, dull, dark orange, yellow within. Flowering-stem 4—5 feet high, erect, cylindrical, stout, hollow, smooth, striate, pale green often tinged with blood-red. Root-leaves large; petioles stout, 9—12 inches long, transversely oval on section, the upper surface with a narrow, well-marked channel above which gradually widens out so as to form a nearly flat surface in the lower portion, the under surface convex, striate with several rather broad, blunt, slightly elevated ridges, with very shallow furrows between, pale green with small red specks, or reddish; stipules (ocreæ) at first completely covering in the

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* *Rha ponticum, i. e.* Pontic Rha or Rheum, the name of the drug Rhubarb in the Latin medical writers, was applied, probably correctly, to the present species by the old pharmacists and botanists.

bud like an extinguisher, afterwards split and chiefly axillary, dark brown, papery, persistent; blade 1½—2 feet long, broadly ovate, cordate at the base, acute at the apex, with several very coarse indentations, chiefly at the upper part, slightly undulated at the margin, upper surface uneven, very slightly rough, bright sap-green, lower surface very finely rough with very short hairs, pale green, the veins very prominent, the two lowest lateral ones nearly equalling the midrib, and bare on the lower side for some distance along their basal portion; stem-leaves few, becoming gradually smaller, narrower, more attenuate and undulated, and deeply dentate, their ocreæ large, brilliant orange. Flowers very numerous, rather larger than those of *R. palmatum*, and on longer, delicate, spreading or drooping, white, glabrous pedicels articulated above the middle third, arranged 2 or 3 (rarely more) together, in clusters scattered on the erect or ascending, very minutely scabrous branchlets of rather lax, oblong, cylindrical, blunt, not tapering, ascending or erect, numerous divisions of the large inflorescence. Perianth very deeply divided into six oblong-oval, very obtuse, spreading or reflexed segments in two rows, imbricate in the bud, pure white, with pale-greenish centre, without veins, the inner ones larger. Stamens as in *R. officinale*, but much shorter than the perianth; anthers small, oblong, introrse, at first deep orange-pink, afterwards white; no disk; ovary as in the last species, reddish, stigma cushiony, white. Fruit as in *R. palmatum*.

Habitat.—This was the first species of Rhubarb known. It was cultivated at Padua, early in the 17th century, by Prospero Alpino, who in 1612 published a figure of it under the name "Rhaponticum thracicum." From his plants several continental gardens were supplied, and three or four seeds being obtained at Venice by Dr. Matthew Lister, were by him given to Parkinson, in whose garden the plant was first raised in England, about the year 1628. Thence they became spread through the gardens of this country.

The plant is a native of Southern Siberia, and extends from the country north of the Caspian to the hilly districts of Tarbagatai

and Alatau, and to the Altai mountains. It has probably a still more extended range eastward, as plants collected by Bretschneider and David in two different mountainous regions of Northern China, north of Pekin, are stated by Dr. Hance to be probably referable to this species. But it is as a cultivated plant that it is best known. It has been grown as a source of Rhubarb in several parts of Europe; and in England its cultivation for this purpose commenced at Banbury in 1777. In this locality it is still cultivated by Mr. R. Usher, to whom we are indebted for the specimens whence the above description is made. The plants flower with him in the beginning of June. Having obtained a suitable root he now propagates entirely by offsets, and his plants never produce any ripe seed. Formerly, when grown from seed, the plants were found to be very variable and fruited abundantly. The form now cultivated presents some differences from typical *R. Rhaponticum,* and has been suggested by Mr. Holmes to be a hybrid with *R. undulatum,* Linn.

These two species are, however, very closely allied, and should perhaps be united. *R. undulatum* (*R. Rhabarbarum,* Linn.) is the common garden Rhubarb, and is also of Siberian origin. It has usually much more undulated leaves, which are also somewhat more pubescent; the character, however, chiefly relied upon is the form of the petiole. This, by Linnæus, was originally described as smooth in *R. undulatum,* and subsulcate in *R. Rhaponticum,* referring apparently to the under surface; it is also downy in the former species. *R. undulatum* is figured in Steph. and Ch., t. 177; Hayne, XII, t. 8, and Nees, tt. 116, 117.

R. compactum, Linn. (*R. nutans,* Pall.), was based on a plant described and figured by Miller, who had the seeds from St. Petersburgh as those of the "true Rhubarb." Miller's figure (Figures, t. 218) is copied in Hayne, XII, t. 9, and Nees, t. 106.

R. hybridum, Murr., a doubtful and variable garden plant, is figured in Nees, Supp., and thought to be hybrid between *R. palmatum* and one of the above species.

Don considered *R. Emodi,* Wall. (*R. australe,* Don), a Himalayan and central Asiatic species, to be the chief source of the

Rhubarb of commerce. Figures of this species will be found in Hayne, XII, t. 6, Berg and Sch., t. 31 a., and Bot. Mag., t. 3508. It is grown for Rhubarb in Silesia, and is a very distinct species.

Another species has been recently described by Muenter under the name *R. Franzenbachii*, from the south margin of the Gobi Desert, Mongolia, which he believes is a source of Chinese Rhubarb.

The genus *Rheum* is, like its near relative, *Rumex*, in a sad state of confusion systematically. There can be little doubt that, also like the Docks, the species freely hybridize, and produce puzzling intermediate forms.

Prosper Alpinus, De Rhapontico (1612); Parkinson, Paradisus terrestris, p. 484 (1629); Linnæus, Materia Medica, p. 67 (1749), and Amœn. Acad., iii, p. 212; Ledebour, Fl. Rossica, iii, p. 496; Meisner, in DC. Prod., xiv, p. 33; Hance, in Journ. Bot., 1875, p. 134; Lindl., Fl. Med., p. 357; Flück. & Hanb., Pharmacog., p. 449; Holmes, in Pharm. Journ., June, 1877, p. 1017; Muenter, in Actes du Congrès Int. de Bot. tenu à Amsterdam in 1877, abstracted in Gard. Chron., 1878, ii, p. 654.

Part Used and Name.—Rhei Anglici Radix; the dried decorticated root of Rheum Rhaponticum, *Linn.* English rhubarb is not official in the British Pharmacopœia, the Pharmacopœia of India, or the Pharmacopœia of the United States; the official rhubarb root of these pharmacopœias being there said to be derived from China, Chinese Tartary, and Thibet. The official root is fully described under "Rheum officinale," and "Rheum palmatum." Besides the present species, which has been the botanical source of English Rhubarb for more than a century, *Rheum officinale*, a species already described by us, is now also being cultivated at Banbury, but the supply of rhubarb obtained from it is at present very limited; and our succeeding remarks apply solely to rhapontic rhubarb.

Preparation.—At Bodicote, near Banbury, which is the only place in England where this plant is cultivated for the sake of its roots, the average annual yield of the dried root is about ten tons. The mode of preparation is as follows:—The roots are dug up

from about the end of July to the beginning of November, and are considered of best quality when seven or eight years old, but they are commonly collected at the age of three or four years. After being brought in from the fields, they are at first freed from the earth which adheres to them, and subsequently the smaller lateral branches are removed from the large central portion of the root, and then both portions are trimmed and pared. Thus the large central portion is first trimmed into a cylindrical mass, which is frequently the size of a child's head, and after further trimming and paring is finally cut longitudinally into pieces; the smaller roots being simply trimmed and pared, and assorted according to their size. In this way the pieces known in the trade as "fine large flats" and "fine large rounds" are obtained from the large central portion of the root; while the "small rounds," and "stick rhubarb," are derived from the smaller branches. All the pieces are carefully dried, at first by exposing them on wicker baskets in a covered shed, to a current of air; and subsequently in the drying room by means of a current of heated air. The drying process must be conducted gradually, otherwise the outer portion becomes dried and much shrivelled, while the central part is still moist. The roots are finally pared and scraped to remove any shrivelled or unsightly parts, and are then, when their preparation is finished, stored in a warm dry place. The raspings obtained in trimming and paring the roots are carefully preserved and ground into powder.

General Characters.—English rhubarb occurs in pieces of various forms and sizes, which are prepared and trimmed in different ways so as to represent in appearance the Chinese rhubarbs. Some are cylindrical or roundish, while others are flattened on one side; these are distinguished in the trade as *rounds* and *flats*. The best pieces have as good a colour and are equal in size to the rhubarbs obtained from China; but usually English rhubarb is light in weight, more or less spongy in the middle, so that the pieces may be easily indented by the nail, pasty under the pestle, and has a more pinkish hue than the rhubarbs of

China. Internally it has a marbled appearance, but the lines or veins present a radiated character at the ends of the cylindrical or rounded pieces, and are more or less parallel on the external surface of the flattened pieces. Its taste is more astringent and mucilaginous, but less bitter, than China rhubarb, and it is also commonly less gritty when chewed, from containing fewer crystals (raphides) of oxalate of calcium. Its odour is feeble and less pleasant than the official rhubarb. The authors of 'Pharmacographia' say that "the structure is the same as that of the Chinese rhubarb, except that, as already stated, the star-like spots, if present, are isolated, and not arranged in a regular zone." We have already referred to this statement in our article on "Rheum palmatum," where we have also mentioned that some specimens of English rhubarb show a similar ring of star-like spots. As also stated above, we find the lines or veins of English rhubarb commonly radiated at the ends, and somewhat parallel on the surface, which according to our experience is rarely the case in Chinese rhubarb.

The powder of English rhubarb, which is said to be frequently sold for, or employed to adulterate, China rhubarb, may be detected by the following test, which was first given by Billot: "On a little of the suspected powder upon a plate let fall two or three drops of oil of anise, oil of fennel, or other essential oil; then add magnesia, and rub the mixture well for three or four minutes. If the powder be pure it will remain yellow, but if it contain the smallest quantity of rhapontic rhubarb it will assume a reddish tint, varying from a salmon to a bright rose-colour, according to the quantity of the impurity present."

Composition.—The composition of rhubarb has already been fully alluded to under "Rheum palmatum."

Medical Properties and Uses.—The properties and uses of English rhubarb are essentially the same as the official rhubarb, and have been described under "Rheum palmatum." Pereira regarded English rhubarb as about two thirds the strength of the rhubarbs obtained from China.

French, German, Austrian, and Indian Rhubarb.—Rhubarb is

produced to some extent in France, Germany, Austria, and India. These kinds are known respectively as French, German, Austrian, and Indian or Himalayan Rhubarb. French rhubarb is chiefly derived from *Rheum Rhaponticum ;* but *R. palmatum, R. compactum,* and *R. undulatum* have also been cultivated for the purpose. At present, however, the cultivation of rhubarb has almost ceased in France ; although it is stated that within the last few years a considerable quantity of rhubarb has been imported into the United States from France, under the name of *Krimea rhubarb,* and employed to adulterate powdered Chinese rhubarbs. German and Austrian rhubarbs are derived essentially from *Rheum Rhaponticum ;* and Indian or Himalayan rhubarb from *R. Moorcroftianum, R. australe,* and *R. Webbianum.* None of these kinds of rhubarbs are of any but local importance, and need therefore no further notice from us.

Per. Mat. Med., vol. ii, pt. 1, p. 492; Per. Mat. Med., by B. & R., p. 574; Pharmacographia, p. 449; U. S. Disp., by W. & B., p. 735; Pharm. Journ., vol. vi, ser. 1, p. 76; vol. ix, ser. 2, p. 81; vol. vii, ser. 3, p. 1017; Billot, in Pharm. Journ., ser. 2, vol. ii, p. 28.

DESCRIPTION OF PLATE.

Drawn from specimens sent by Mr. R. Usher, and cultivated by him near Banbury; the fruit added from a Siberian specimen in the British Museum.

1. Portion of flowering-panicle.
2, 3. A flower.
4. Pistil.
5, 6. Fruit.
7. Root-leaf (much reduced).
8. Section of upper—and 9, of lower part of petiole.
10. Root.
11. Section of the same.

(3, 6 enlarged.)

D.E.Lunn F.L.S. ad. nat. del. et lith.

Mde N. Hanbal. imp.

CHENOPODIUM ANTHELMINTICUM, *Linn.*

N. Ord. SALSOLACEÆ. Lindl., Veg. Kingd., p. 512; Le Maout & Dec., p. 637.

Tribe *Chenopodieæ.*

Genus Chenopodium,* *Linn.* DC. Prod., xiii, pt. 2, pp. 61—80. Species 60 or 70, natives of the temperate regions of both hemispheres.

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216. Chenopodium anthelminticum, *Linn., Sp. Plant., ed.* 1, *p.* 220 (1753).

Wormseed. Jerusalem Oak.

Syn.—C. ambrosioides, var., *A. Gray.* Ambrina anthelmintica, *Spach.* C. suffruticosum, *Willd.*

Figures.—Barton, t. 44; Dillenius, Hist. Elthamensis, i, t. 66, fig. 66; Flora Brasiliensis, fasc. 37, t. 47.

Description.—A perennial herb. Stem erect or ascending, 1½—5 feet high, stout, stiff, much branched above, smooth or minutely puberulous or hairy with scattered spreading hairs, striped with green, branches very long, ascending, very numerous above and gradually shorter so as to form an elongated pyramidal head. Leaves numerous, alternate, without stipules, shortly stalked, the larger ones (on the main stem and base of the branches) 3—6 inches long, rhombic-ovate, the smaller ones rhombic-oblong, much attenuated at the wedge-shaped base into the petiole, acute at the apex, deeply sinuate-dentate, with large unequal entire teeth, the uppermost leaves linear almost entire, all glabrous, thin, bright green, gland-dotted beneath. Flowers very small and numerous, mostly unisexual, monœcious or polygamous, sessile, arranged in small sessile few-flowered clusters without bracts (the central flower male or bisexual, the remainder female), on the sides of numerous slender, elongated, filiform, puberulous, ascending, axillary branches, ½—2½ inches long, almost or quite leafless, and forming usually slender pyramidal panicles. Male, or bisexual, flowers:—

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* *Chenopodium*, a mediæval name; from χήν, a goose, and πούς, a foot, in allusion to the form of the leaves of some common species.

perianth deeply cut into 5 (rarely 4), broadly ovate, obtuse segments spreading in flower, afterwards connivent, dotted with glands; stamens 5, hypogynous, opposite the perianth-segments, exserted, spreading, anthers subglobose. Female flowers much smaller than the male; perianth globose-pearshaped, almost closed at the mouth, which is divided into 2—5 very small teeth; ovary rounded, covered on the top with small stalked glands, 1-celled, with a single basal ovule, style divided into usually filiform papillose branches. Fruit very small, closely invested by the persistent perianth which completely covers it, much depressed, circular, pericarp very thin, membranous, readily detached. Seed horizontal, about the size of poppy-seed, the same shape as the fruit which it completely fills, testa smooth, shining, brownish-black, hilum lateral; embryo peripheral, horizontal, curved round the mealy endosperm.

Habitat.—This weed, closely allied to some of our common goosefoots, grows in waste places, on rubbish, by roadsides and similar places in the United States, Mexico, many parts of Brazil, the Argentine Republic, and doubtless other parts of South America, also in Barbadoes and Porto Rico; it is rare in the middle and northern United States, but becomes common southwards. It flowers all the autumn. The plant has become introduced into India, but does not occur elsewhere in the old world.

It is very variable, especially in the appearance of the inflorescence. Fenzl distinguishes two varieties, *glabratum* and *subhirsutum;* the latter is sometimes very hairy (as shown in Dillenius' figure of a young plant above quoted), and perhaps connects this species with *C. chilense,* Schrad.

C. anthelminticum is much confounded with *C. ambrosioides,* Linn., of which, indeed, A. Gray makes it a variety. The true plant is distinguished by its leafless spikes and heavy odour which is considered very disagreeable by most persons, or even "excessively disgusting" by some. *C. ambrosioides* (as well as *C. chilense*), on the contrary, has a pleasant aromatic smell; it is densely covered with long glandular hairs, and the spikes are always leafy. This latter is a very widely spread plant over all the

warmer countries of the world, growing throughout Continental Europe except the north, Madeira, the Canaries, North Africa, Persia, India, China, Tropical Africa, the Cape, Madagascar, Australia, New Zealand, and the whole American Continent from New York to Patagonia. It is figured in Nees t. 122, and Hayne xiii, t. 15. This (or *C. chilense*) represents *C. anthelminticum* in all the London botanic gardens.

A. Gray, Man. Bot. N. U. States, p. 364; Chapman, Fl. South. States, p. 377; Moquin-Tandon, in DC. Prod., xiii, pt. 2, p. 73; Fenzl, in Fl. Brasil., fasc. 37, p. 149; Lindl., Fl. Med., p. 348.

Official Part and Name.—Chenopodium, *Wormseed;* the fruit (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India.

Cultivation and Collection.—This plant is extensively cultivated in Maryland, to the North of Baltimore. The whole herb is impregnated with a volatile oil which gives it a strong, peculiar, and offensive odour, which it retains in a dried state. Its medical properties are due to the presence of this oil, and hence all parts of the plant possess more or less activity, but the fruit is alone official. This should be collected in October, when ripe. The oil, which is also official, is obtained near Baltimore, by distillation from the whole plant, in the first half of September. The yield of oil is from 1·5 to 2 per cent., and the produce of an acre about 20 pounds. The whole crop of Baltimore oil amounted in 1872 to 3000 pounds.

General Characters and Composition.—This drug consists of minute fruits, and not seeds as its common name of *wormseed* would lead us to expect. These fruits are very small, being usually only about the size of a pin's head, or even in some cases smaller; they have an irregular rounded form, are light in weight, of a dull brownish or greenish-yellow colour externally, and have a strong, peculiar, disagreeable, somewhat aromatic odour, and a pungent, bitter, aromatic, nauseous taste. When these fruits are rubbed in the fingers, their nature is at once evident, for under such circumstances their pericarps are removed,

and each fruit is then seen to contain a solitary, smooth, glistening, blackish seed.

Wormseed owes its properties, as already noticed, to the presence of a *volatile oil*, which is readily obtained by distillation. This oil, which is official in the United States Pharmacopœia, under the names of *Oleum Chenopodii* and *Oil of Wormseed*, is largely prepared, as we have seen, near Baltimore from the cultivated plants, but it is also distilled in other districts from those growing wild. The best oil, such as that from Baltimore, is of a light yellow colour when recent, but it becomes darker by age, being then deep yellow or even brownish. It has a strong, peculiar, and very offensive odour; and a pungent, extremely disagreeable, somewhat aromatic, bitterish taste. Its specific gravity, according to Garrigues, is said to increase by keeping, being 0·908 when recent, and about 0·960 when kept till it becomes of a brownish-yellow colour. It is freely soluble in alcohol or ether, and boils at 374°. Garrigues describes it as consisting of two oils separable by distillation, one, a light oil, resembling oil of turpentine in composition and some of its reactions, and the other a heavy oil, which contains oxygen as well as carbon and hydrogen.

Substitutions.—The fruits of *Chenopodium ambrosioides*, L., commonly known as *Sweet pigweed*, and of *C. Botrys*, L. or *Jerusalem Oak*, have similar properties to those of the official species, and are often substituted for them.

Medical Properties and Uses.—The whole plant of *Chenopodium anthelminticum* has long had a popular reputation in the United States as a vermifuge; and the fruits are now regarded in regular practice as a most efficient anthelmintic. The great objection to this drug and its oil is their offensive odour and disagreeable taste. The plant is also employed by the Cherokee Indians in "painful and profuse menstruation, but is chiefly resorted to by women verging upon the 'grand climacteric' turn of life."

The effects of wormseed are said to be more particularly manifest upon the roundworm (*Ascaris lumbricoides*) of children. Chenopodium is given in the form of powder or volatile oil.

When the powder is used this is best mixed with syrup in the form of an electuary, in doses of from 20 to 30 grains for a child of two or three years old, and for an adult of from 60 to 120 grains. The oil is, however, the more usual form of administration, the dose for a child is from four to eight drops; it may be given mixed with sugar, or in the form of an emulsion. After the medicine has been taken at bedtime and in the morning before breakfast for three or four days, it should be then followed by a brisk cathartic. Care should be taken in its administration, as in improper doses the oil has caused injurious if not fatal effects. Chenopodium is also reputed to possess antispasmodic properties, and has been used in hysteria, chorea, and other nervous affections.

Chenopodium olidum, Sm., commonly called *Stinking goosefoot*, an indigenous species, had formerly a reputation in this country as an antispasmodic and emmenagogue, and was formerly official in the London and Edinburgh Pharmacopœias.

U. S. Disp., by W. & B., pp. 255 and 1305; Stille's Therap. and Mat. Med., vol. ii, p. 611; Wood's Therap. and Pharmacology, vol. ii, p. 868; Per. Mat. Med., vol. ii, pt. 1, p. 504; Steph. and Church., Med. Bot., by Burnett, vol. iii, pl. 176; Amer. Journ. Pharm., vol. xxii, p. 304; Garrigues, in Amer. Journ. Pharm., vol. xxvi, p. 405; Evans, in Proc. Amer. Pharm. Assoc. for 1859, p. 397; Monsarret, in Med. Times, Dec., 1844, p. 140; Boston Med. and Surg. Journ., vol. xlv, p. 373.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in Florida by Chapman.

1. End of a branch in flower.
2. Part of flower-spike.
3. A male (hermaphrodite) flower.
4. A female flower.
5. The pistil.
6. Fruit.
7. The same seen from above.
8. Seed.
9. Transverse section of the same.
10. A lower leaf.

(2–9 enlarged.)

PEUMUS PHILIPPUS, *Molina*

N. Ord. MONIMIACEÆ. Lindl., Veg. Kingd., p. 298; Le Maout and Dec., p. 647; Baill., Hist. Pl., i.

Tribe *Hortonieæ.*

Genus Peumus,* *Molina.* Baill., l. c., p. 339. The following is the only species.

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217. Peumus Boldus,† *Molina, Sagg. sull. Storia Nat. Chili, p.* 185 (1782).

Boldo. Boldu.

Syn.—P. fragrans, *Pers.* Ruizia fragrans, *R. & Pav.* Boldoa fragrans, *Cl. Gay.*

Figures.—Endlicher, Iconographia, t. 21; Bot. Register, t. 57; Lindl., Veg. Kingd., p. 298; Baillon, Hist. Pl., i, fig. 324; Pavon, Fl. Per and Chil. Prodr., t. 29 (flowers); Tulasne, in Arch. der Muséum, viii, t. 31, fig. 3 (fruit).

Description.—A shrub 10—20 feet high, with many slender, cylindrical, opposite branches covered with a pale, grey-brown, nearly smooth bark with scattered lenticels, young twigs rough with stellate hairs. Leaves numerous, opposite, very shortly stalked, without stipules, evergreen, $1\frac{1}{4}$—$2\frac{1}{2}$ inches long, broadly oval, very obtuse at the apex, usually rounded at the base, margins quite entire, somewhat undulated, often recurved, thick, dark green, bullate and shining on the upper surface, paler beneath, rough on both surfaces with scattered wart-like projections which, on the under surface, are set with short spreading bristles; there are also numerous minute stellate hairs beneath. Flowers unisexual, dicœcious, on long stalks, $\frac{1}{2}$—$\frac{3}{4}$ inch wide, erect, arranged in short, lax, few-flowered, terminal or axillary, small trichotomous cymes, with minute deciduous bracts, buds oblong-ovoid, blunt, densely pilose, like the pedicels, with close stellate hairs. Male flower:—Perianth with a broadly top-shaped or subcampanulate fleshy tube (receptacle), minutely but densely

* *Peumus*, from Peumo, the native Chilian name.

† *Boldus*, from the native name Boldo or Boldu, which is, however, also applied to a Lauraceous shrub (*Boldu Chilanum*, Nees).

stellate-pilose outside, and thickly covered inside with long, white, stiff, shining hairs, divided above into a variable number of imbricated segments in two series, the outer row sepaloid, 4—6, unequal, broadly oblong, blunt, very strongly imbricated, at first spreading, afterwards strongly recurved, the inner series petaloid, 5—8 (usually 7), distant, somewhat unequal, oblong, strap-shaped, subacute, at first about as long as the outer row, ultimately much longer, spreading horizontally, often twisted, slightly pilose or quite glabrous, pale greenish-yellow; stamens numerous (30 or more), distinct, inserted irregularly over the whole interior of the perianth-tube, filaments long, slender, equal, at first spreading, when fully expanded strongly recurved over the edge of the flower, glabrous above, wider and with long white silky hairs below above which are placed two small stalked lateral glands; anthers small, 2-celled, orange, dehiscing vertically down the edges, and then becoming inverted; carpels none. Female flowers :—Perianth as in the male; stamens represented by (usually) 5 small abortive staminodes; carpels few, 2—5, inserted at the base of the perianth-tube, distinct, pilose, with a single pendulous ovule, style simple. Fruit of 1—5 (usually 3) apiculate, roundish-ovoid, pale yellow drupes, sessile on the dry, convex, inverted perianth-tube, about the size of a pea, with a few scattered stellate hairs, pulp rather scanty, adherent to the stone, which is thin, irregularly channelled, bony, and very hard, with a perforation on one side at the top. Seed solitary, pendulous, completely filling the stone; embryo small, with a superior radicle and ovate, pointed, widely divaricate cotyledons at the upper part of the copious cheesy endosperm.

Habitat.—The Boldo is a native of Chili, in the central provinces of which country it is very common, growing on sunny hillsides in the neighbourhood of Valparaiso, Santiago, Valdivia, Concepcion, &c. It is also grown there frequently in gardens. The evergreen leaves are very fragrant, and the flowers have also a most agreeable scent: the latter appear especially in the autumn, but the plant seems to blossom nearly all the year round, and in cultivation, at Kew and the Regent's Park, they have appeared in

winter. The buds take a long while to mature themselves, and for several months remain apparently stationary. The plants seen here are all male.

The peculiar structure of *Monimiaceæ* has led to various views of their proper position. We have followed the leading botanists in placing them among Apetalæ; but they have clearly affinities also with *Calycantheæ* (which Baillon unites with this order), *Magnoliaceæ*, and especially *Rosaceæ* among Polypetalæ, and the Order well illustrates the artificial nature of the separation of the apetalous and polypetalous families.

The minute anatomy of the stem has been described and illustrated by Verne in the paper quoted below.

C. Gay, Flora Chilena, v, p. 353; DC. Prod., xvi, pt. 2, p. 673
Verne, in Adansonia, xi, p. 341, and t. 11.

Part Used and Name.—Boldoæ Folia; the leaves. This new remedy, which has been recently introduced from Chili, is commonly termed *Boldo*. It is not official in the British Pharmacopœia, the Pharmacopœia of India, or the Pharmacopœia of the United States.

General Characters and Composition.—The characters of the fresh leaves have been already given in our botanical description. In a dried state they have a reddish-brown colour, a coriaceous texture, and are covered with small glands, and when rubbed they have an agreeable aromatic odour, which reminds us of the leaves of the small shrubby plant *Myrica Gale*, L., commonly known in this country as *Sweet Gale;* but Claude Verne, who has made Boldo the subject of an elaborate investigation, says their odour recalls that of the Lauraceæ and Labiatæ. When chewed they have an aromatic pungent taste.

The principal constituents of Boldo, as shown by the experiments of MM. Bourgoin and C. Verne, more especially of the latter, are a *volatile oil*, and an alkaloid which they have termed *boldine*. The most abundant product is the volatile oil, which Verne obtained by distillation from the leaves mixed with portions of the stem, in the proportion of about 2 per cent. This oil has

the same odour as the plant, and seems to be a mixture of several oils with different boiling points. It has no reaction on litmus paper; is very slightly soluble in water, but communicates to it its flavour, and a slightly acid reaction. It is freely soluble in alcohol. Sulphuric acid colours it hyacinth red, nitric acid violet, potash red; and hydrochloric acid decolorises it. The crude oil is strongly coloured, but becomes clear yellow by rectification, by which its odour, which is strong, is also improved. It possesses a burning taste. It should be noticed that only a trace of this oil could be obtained by the distillation of the fresh leaves and stems of a plant grown in Paris. The medical properties of Boldo would appear to be mainly due to this volatile oil; although to some extent also, probably, to the alkaloid *boldine*, which the investigations of Bourgoin and Verne proved to exist only in small proportion, about 1 part in 1000 in the leaves operated upon. Boldine is described as very slightly soluble in water, to which, however, it communicates an alkaline reaction and a manifestly bitter taste. It is soluble in alcohol, ether, and chloroform.

Medical Properties and Uses.—The properties attributed to Boldo are that it acts as a stimulant to digestion, and has a marked influence on the liver. Both the leaves and young stems possess similar properties, but the former are more commonly used. The alleged virtues of the plant are reputed to have been discovered by noticing the beneficial effects which followed the shutting up of a flock of sheep suffering from liver disease within an enclosure which had been recently repaired with boldo twigs. The sheep are reported to have eaten the leaves and shoots, and recovered speedily. Various preparations of boldo have been administered by Dr. Dujardin-Beaumetz, it is said, with success, in the Hôtel Dieu and Hôtel Beaujon, in cases of atony of various organs when the patients have been unable to tolerate quinia. But care is required, in their administration, as vomiting is provoked by large doses. As a remedy, however, it does not appear to have found much favour, and has now almost, if not entirely, disappeared from use in European practice. But in South

America various preparations of boldo are prescribed as digestives, carminatives, tonics, and diaphoretics. Boldo is also there a popular remedy in syphilis and diseases of the liver. The dried leaves when reduced to powder, are also used as a sternutatory.

Besides its medicinal use in Chili, the sweet mesocarp of its fruit is eaten; the bark is employed for tanning purposes; and the wood is esteemed for charcoal making.

Journ. de Pharm. et de Chim., 4th ser., vol. xv, p. 223; Pharm. Journ., ser. 3, vol. iii, p. 323, and Year Book of Pharmacy (1873), p. 97, from Journ. Pharm. Chim., 4th ser., vol. xvi, p. 191; Pharm. Journ., ser. 3, vol. v, pp. 404 & 453; Étude sur le Boldo, par Claude Verne, Paris, 1874; Proc. Amer. Pharm. Assoc., vol. xxiii, pp. 227 & 335.

DESCRIPTION OF PLATE.

Drawn from a plant in the Royal Gardens, Kew; the carpels added from Endlicher; the fruit from a specimen in the Economic Museum, Kew.

1. A branch of a male plant with flowers.
2. Upper, and—3. Under surface of a male flower.
4. Vertical section of the same.
5. A stamen.
6. An anther burst.
7. Carpels.
8. Vertical section of a carpel.
9. A fruit.
10. Vertical section of a drupe.
11. Embryo.

(2–8, 10, 11 enlarged.)

J. Blau ad nat. del. et lith.

MYRISTICA FRAGRANS Houtt.

M. & N. Hanhart imp.

N. Ord. Myristicaceæ. Lindl., Veg. K., p. 301; Le Maout & Dec., p. 650; Baill., Hist. Pl., ii.

Genus **Myristica**,* *Linn.* A. DC., in DC. Prod., xiv, p. 189. Species over 80, all tropical, and mainly Asiatic, but some American and a few Australian.

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218. Myristica fragrans, *Houttuyn, Hist. Nat.*, ii, *pt.* 3, *p.* 233 (1774).

Nutmeg.

Syn.—M. moschata, *Thunb.* M. officinalis, *Linn. f.* M. aromatica, *Lam.*

Figures.—Woodville, t. 238; Roxburgh, Pl. Coromandel, t. 274, cop. in Hayne, ix, t. 12; Nees, t. 133; Bot. Mag., 2756, 2757, cop. in Steph. & Ch., t. 104; Berg & Sch., t. 13 a; Hook., Exotic Bot., tt. 155, 156; Blume, Rumphia, t. 55; A. DC., in Fl. Bras., fasc. 25, t. 38; Baill., ii, figs. 298–306.

Description.—A small evergreen tree 25—40 feet high when full grown, with numerous spreading branches covered with greyish-brown rather smooth bark; younger branches green. Leaves alternate, shortly petiolate, without stipules, somewhat convex above, 4—6 inches long, ovate or oblong-ovate, acute at both ends, entire, smooth, strongly veined, dark green, paler beneath. Flowers dicœcious: in small axillary racemes of 2—6 flowers, in the female tree sometimes solitary; pedicels slender, drooping, with a single, quickly deciduous, rounded bract just below the flower. Perianth about $\frac{3}{8}$ inch long, fleshy, bell-shaped or urceolate, nearly smooth, pale yellow, cut into 3 (rarely 4), spreading or erect, triangular, acute teeth, æstivation valvate. Male flowers:—Stamens combined into a central fleshy column, about as long as the tube of the perianth, with about 6—10 linear, 2-celled anthers occupying its upper two-thirds and opening longitudinally. Female flowers:—Ovary superior, one-celled, with a single erect anatropous ovule, a little shorter than

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* *Myristica*, from μυριστικός, suitable for an ointment (μύρον); a mediæval name for the "nut."

the perianth, broadly ovate, acute at the apex and terminating in two persistent stigmas. Fruit pendulous, about 3 inches long by 2 wide, having much the external appearance of a small pear, but grooved by a longitudinal furrow which passes through the somewhat lateral apiculus marking the position of the stigmas, smooth, yellow; pericarp nearly ½ inch thick, tough and fleshy, yellowish-white, dehiscing from above along the furrow into two equal valves, and containing a single erect seed which completely fills the cavity, out of which it readily falls when ripe. Seed about 1¼ inch long, broadly ovoid, blunt, closely enveloped and almost completely covered by an irregularly cut, fleshy arillus ("mace"), which is cup-shaped round the basal hilum, and much folded over the top of the seed, brilliant scarlet when fresh, but yellow and brittle when dry; testa very hard and thick, dark brown, smooth and shining, marked with impressions from the tightly appressed arillus; inner seed-coat thin, membranous, pale brown; nucleus of the seed ("nutmeg") wrinkled externally, mainly consisting of the abundant endosperm, which is rather soft but firm, whitish, and marbled with numerous reddish-brown vein-like partitions, into which the inner seed-coat penetrates (ruminated); embryo at the base near the hilum; radicle small; cotyledons foliaceous, laciniated.

Habitat.—The nutmeg tree is a native of the Moluccas and other Indian islands, Amboyna, Bouro, New Guinea, &c., preferring a light soil, shade, and a moist atmosphere. Its cultivation is successfully carried on chiefly in the same islands, and especially in the small volcanic Banda group where the tree was first discovered, but also in the Philippines, Bencoolen, Penang, and Singapore, as well as in Mauritius, the West Indies, and South America. The plant was first introduced into our stoves in 1795 by Sir Joseph Banks, and specimens are now to be seen in several botanic gardens. Male trees are said to be much more frequent than female.

A. DC., in DC. Prod., xiv, p. 189; Hook. f. and Thomson, Fl. India (1855), i, p. 154; Miquel, Fl. Ind. Batav., i, 2, p. 53; Lindl., Fl. Med., p. 21.

Official Parts and Names.—1. Myristica, *Nutmeg;* the kernel of the seed of Myristica officinalis, *Linn.*: 2. Oleum Myristicæ, *Volatile Oil of Nutmeg;* the oil distilled in Britain from Nutmeg: 3. Oleum Myristicæ Expressum, *Expressed Oil of Nutmeg;* a concrete oil obtained by means of expression and heat from nutmegs (B. P.). The kernel of the fruit (*Myristica*) of Myristica officinalis, *Linn.* (I. P.). 1. Myristica; the kernel of the fruit of Myristica fragrans, *Houttuyn*: 2. Oleum Myristicæ; the volatile oil obtained from the kernels of the fruit: 3. Macis; the arillus of the fruit.

1. Myristica. *The Nutmeg.—Collection and Preparation.* At Bencoolen the nutmeg tree bears all the year round, but more plentifully in some months than in others. But the great harvest is generally in the four last months of the year, and there is a smaller one in April, May, and June. The fruit when ripe splits open spontaneously on one side, and is gathered by means of a hook attached to a long stick; the pericarp is then removed from the solitary seed, after which the aril (*mace*) is carefully stripped from the other parts of the seed (*nut*), and the mace and the nut are then separately prepared for the market.

The mace will be described hereafter under the head of Macis; we now allude to the preparation of the nutmeg only. For this purpose the nuts are taken to the drying house, placed on hurdle-like frames, and smoke-dried for about two months by the smouldering heat of a wood fire at a temperature not exceeding 140°, and with suitable arrangements for a proper circulation of air. The nuts are turned every second or third day, and when thoroughly dried, the kernels, which are the nutmegs of commerce, rattle in their shell. The shells are then cracked with wooden mallets, the worm-eaten and shrivelled kernels are rejected, and the good ones picked out and rubbed over with well-sifted dry lime. The nutmegs are then finally packed for exportation in tight casks, the insides of which have been smoked, and covered with a coating of fresh water and lime. Nutmegs are prepared by the Dutch in the Banda Islands in a nearly similar way, but before being smoke-dried they are first

sun-dried for a few days; and when thoroughly dried as above described on hurdle-like frames, they are prepared for the market by dipping them in a mixture of salt water and lime, and afterwards spreading them out on mats for four or five days in the shade to dry. The first process is regarded as the best. In the Banda Islands the smaller nutmegs are reserved for preparing the expressed oil. The practice of liming nutmegs originated with the Dutch, who by thus destroying the vitality of the seed endeavoured to limit the cultivation of the nutmeg tree to their own possessions in the Banda Islands and Amboyna. The process of liming nutmegs having thus become an established custom is still very extensively followed, for although in this country we prefer the *unlimed nutmegs*, these are scarcely saleable abroad. The best mode of preserving nutmegs would be in their natural shell (*nutmegs in the shell*), but they are rarely seen in this state in Europe or America, although preferred as thus prepared by the Chinese.

General Characters, Varieties, Commerce, and Composition.— The nutmeg, which, as we have seen, is the dried nucleus or kernel of the seed, is oval or roundish in shape; it varies in size, but rarely exceeds 1 inch in length by about $\frac{4}{5}$ of an inch in breadth; and averages about $\frac{1}{4}$ of an ounce in weight. The largest nutmegs are to be preferred. The colour of the unlimed nutmeg is greyish-brown, and hence this is called the brown nutmeg; that of limed nutmegs is brown in the projecting parts, and white from the presence of lime in the depressions. All nutmegs are smooth to the touch, marked externally with reticulated furrows, and have a greyish-red colour internally, varied with darker brownish-red veins from the projection inwards of their inner seed-coat (*endopleura*), so that the transverse section has a marbled appearance. Their odour is strong and pleasantly aromatic, and their taste agreeably aromatic, warm, and bitterish.

Several commercial varieties of nutmegs are known in the markets. These are distinguished from their geographical sources, as Dutch or Batavian, Sumatra, Penang, Singapore, Java, &c. The most esteemed, and those commonly distinguished till

recently in the London market, were the Penang, Dutch, and Singapore, but in consequence of the destruction of the nutmeg trees in Penang and Singapore some years since, nutmeg cultivation in these islands has considerably decreased of late years, in fact, at one time, had entirely ceased. Penang nutmegs are always unlimed and hence most esteemed in this country, Dutch or Batavian are limed, and Singapore are commonly unlimed, and of inferior quality. By far the largest supplies of nutmegs are derived from the Banda Islands; these are all at first shipped to Batavia. The quantity of nutmegs imported annually into the United Kingdom is probably about 560,000 lbs., and into the United States not less than 500,000 lbs.

Besides the true or official nutmeg as just described, another but very inferior nutmeg, which is the produce of *Myristica fatua*, Houtt., is also sometimes met with in commerce. It is commonly distinguished as the *long nutmeg*, from its greater length as compared with the true nutmeg, which is frequently called the *round nutmeg*.

The principal constituents of nutmegs are *fat*, forming about 28 per cent., and which is described below under the name of Oleum Myristicæ Expressum, and from 2 to 3 per cent. of *volatile oil*, which is also described below under the official name of Oleum Myristicæ. Nutmegs also contain *starch*, *albuminoid matter*, and other unimportant constituents.

Medical Properties and Uses.—Nutmeg possesses like the other spices, aromatic, stimulant, and carminative properties; but in large doses it is narcotic, producing effects, it is said, similar to those of camphor. It has been used with advantage in mild cases of diarrhœa, flatulent colic, and certain forms of dyspepsia; but in medicine it is principally employed as an adjunct to other remedies, in order to cover their taste or to correct their unpleasant operation.

The principal consumption of nutmegs is, however, as a condiment. Used in this way they serve to flavour food substances, and by their stimulant properties to assist their digestion. But on account of their narcotic qualities they should be employed with

Church., Med. Bot., by Burnett, vol. ii, pl. 104; Lumsdaine, in Pharm. Journ., vol. ii, 1st ser., p. 516; Crawfurd, Dict. Indian Islands, 1856, p. 304; The Malay Archipelago, by Wallace, vol. i, p. 452; Seemann, in Hooker's Journ. Bot., vol. iv (1852), p. 83; Collingwood, in Journ. Linn. Soc., vol. x (Bot.), p. 45; Gmelin's Chem., vol. xiv, p. 389, and vol. xvi, p. 209; Journ. de Pharm., Fev., 1864, p. 150; Royle's Mat. Med., by J. Harley, p. 464.

DESCRIPTION OF PLATE.

Drawn from a male plant in Kew Gardens; the female flower added from Roxburgh.

1. A branch with flowers.
2. Section of male flower.
3. Column of stamens.
4. Section of the same.
5. A female flower opened.
6. Fruit bursting open.
7. The same with one valve removed, showing the seed.
8. Section of seed.
9. Seed with the testa removed.

(2—5 enlarged.)

NECTANDRA RODIÆI, *Schomb.*

N. Ord. LAURACEÆ. Lindl., Veg. Kingd., p. 535; Le Maout and Dec., p. 652; Baill., Hist. Pl., ii.

Tribe *Oreodaphneæ*.

Genus **Nectandra**,* *Rolander*. Baill., l. c., p. 477; Meissner, in DC. Prod., xv, pt. 1, pp. 146–168. Species 70 or more, natives of tropical America, chiefly of Brazil.

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219. Nectandra Rodiæi,† *Schomburgk in Hook., Lond. Journ. Bot.*, iii, *p.* 626 (1844).

Sipiri. Brown Greenheart. Bibiru.

Not previously figured.

Description.—A large tree reaching a height of 60 to 80 feet, with an erect trunk, bare below and branched only at the summit; bark smooth, whitish-grey; the youngest branches covered with a very fine tomentum. Leaves sub-opposite, on short peduncles, channelled above, about 6 inches long, oblong-oval, acuminate, entire, with the margins somewhat recurved, and slightly undulated, thick, smooth on both surfaces, very shining above, rather paler beneath. Flowers small, on pedicels about $\frac{1}{4}$ inch long, arranged in small trichotomous axillary panicles, which are 1—$1\frac{1}{2}$ inch long; bracts none (?), panicle-branches tomentose. Perianth with a campanulate tube, deeply cut into (normally) 6 spreading, oval, blunt, thick, often unequal segments which are deciduous, the whole covered externally and internally with a dense tomentum of papillose, white or somewhat fulvous hairs. Stamens 9, arranged in 3 rows, nearly equal, the inner row rather shorter, inserted on the tube of the perianth, filaments none, anthers oblong, thick, erect, obtuse, covered with short, orange-red, papillose hairs, the outer row extrorse or introrse, the middle row introrse, the inner row extrorse, all 4-celled, with the oval orifices in pairs one above the other and opening by

* *Nectandra*, probably compounded of the Latin *necto*, to bind, and the Greek *ἀνηρ*, stamen, and alluding to the four cells of the anthers.

† After Hugh Rodie, a surgeon of Demerara, formerly in the Royal Navy, who first discovered the medicinal properties of the tree.

valves; staminodes none. Ovary simple, 3-lobed, 1-celled, with adpressed silky hairs, tapering into the thick style, which about equals the stamens, stigma terminal rounded. Fruit roundish-ovoid, very blunt or sub-pyriform, somewhat compressed laterally, 2—3 inches long, supported on a short, shallow cup, nearly an inch in diameter, formed of the persistent, enlarged, woody tube of the perianth, pericarp thin, sub-coriaceous, brittle, grey-brown with small whitish spots. Seed solitary, very large, filling the fruit, testa very thin, membranous, cotyledons large, plano-convex, often somewhat unequal, completely including the short superior radicle; no endosperm.

Habitat.—This fine forest tree grows only in British Guiana, and is found abundantly on the hill sides from 20—100 miles from the coast, growing in rocky soil at a slight elevation. Further inland it disappears altogether. The flowers, which are, from the habit of growth of the tree, very difficult to obtain, possess a fragrant odour resembling jasmine.

Miquel, following Nees, doubtfully refers this as a local variety to *N. leucantha*, Nees, a native of Brazil; but the figure he gives of that species ('Stirp. Surinam.,' t. 58), which is quoted by Meissner for *N. Rodiæi*, appears very unlike our plant.

The flowers, as noticed by the original describer, are very frequently abnormal, and variable in the number of their parts. In Schomburgk's description the stamens are said to be 12, and the number of divisions of the perianth certainly varies. We are unable to detect any glandular bodies at the base of the 3 inner stamens (as described), and the outer row (usually said to be introrse) appear to us extrorse. Our material, however, has been very scanty.

Of this large but little known genus, twelve species are finely figured in the 'Flora Brasiliensis.'

Rodie, in Guiana Royal Gazette, 8 August, 1844; Schomburgk, in Hook., Lond. Journ. Bot., 1844, p. 626; Miquel, Stirp. Surinamenses (1850), p. 196; Meissner, in DC. Prod., xv, pt. 1, p. 155, and in Fl. Bras., fasc. 41, p. 264.

Official Parts and Names.—1. Nectandræ Cortex; the bark: 2. The sulphate of an alkaloid prepared from Nectandra or Bebeeru bark (B. P.). The bark (I. P.). Nectandra; the bark (U. S. P.).

1. Nectandræ Cortex.—*General Characters and Commerce.*—This bark which is known under the names of *Bebeeru, Bibiru,* or *Greenheart Bark,* is found in commerce in long, flat, very hard, heavy pieces, from one to two feet long, two to six inches broad, and a quarter of an inch or more in thickness. It has a greyish-brown colour externally, and is dark cinnamon-brown on its inner surface, which is marked by evident longitudinal striæ. It is brittle, although it breaks with difficulty, and its fractured surface presents a coarse-grained appearance, except towards the interior, where it is rather fibrous. It has no marked odour; but its taste is strongly and persistently bitter, and very astringent.

Bebeeru bark is imported from British Guiana in barrels or bags, the former containing about 80 lbs. each, and the latter from 56 to 84 lbs. Its supply in the English market is very uncertain.

Composition.—The essential constituents of bebeeru bark, according to Maclagan, are an alkaloid called *beberia,* and *tannic acid.* It also contains *resin* and other unimportant substances. Beberia has been regarded until lately as a peculiar alkaloid only obtainable from this bark; but the experiments of Walz, and more especially of Flückiger, have shown that Beberia is undistinguishable from *Buxine,* the alkaloid of *Buxus sempervirens;* and further that the alkaloid termed *Pelosine,* obtained from the stems and roots of *Chondrodendron tomentosum* and *Cissampelos Pareira,* as is stated by us in our descriptions of those plants, is also of an identical nature. *Beberia* or *bebeerine,* or more properly *buxine,* is a colourless amorphous substance, soluble in 1400 parts of boiling water, according to Flückiger, in 13 of ether, and in 5 of absolute alcohol, the solutions in each case having a distinctly alkaline reaction. The salts of beberia are uncrystallizable.

Maclagan and Gamgee have recently obtained from the *wood* of the greenheart tree, three other alkaloids, one of which they have named *nectandria;* the two others have not yet been fully investigated. Maclagan has also obtained from the *seeds* of this plant, a colourless, crystalline, volatile, deliquescent substance, which he has named *bibiric acid.*

Medical Properties and Uses.—Bebeeru bark possesses tonic and astringent properties, but it is scarcely ever employed in itself, but is official only for the sake of its alkaloid, which is used in the form of sulphate of beberia now to be described.

2. Sulphate of Beberia.—*General Characters.*—This salt, as obtained according to the directions of the British Pharmacopœia, occurs in dark-brown, thin, translucent scales, yellow when in powder, with a strong bitter taste, soluble in water and alcohol, and entirely destructible by heat. According to Flückiger, it contains about one third of its weight of the pure alkaloid.

Medical Properties and Uses.—Sulphate of beberia is regarded as tonic and antiperiodic in its properties. It has been strongly recommended by Maclagan and others as an economical and valuable substitute for sulphate of quinia in intermittent and remittent fevers, neuralgia, tic douloureux, and other affections in which quinine has been found beneficial; but the experience of Garrod and many other physicians show that it is very inferior in power to sulphate of quinia. As an astringent tonic in general debility and atonic conditions of the alimentary mucous membrane, it appears to be, however, especially suitable, as it rarely or never causes nausea, headache, or the other unpleasant effects which so frequently follow the use of quinine. Dr. Merrill, of the United States, has also found sulphate of beberia very useful in various uterine diseases, as dysmenorrhœa, menorrhagia, leucorrhœa, and all other conditions accompanied with enlargement and congestion of the uterus and its appendages. It has likewise been found useful in affections of the kidneys and bladder, and in blenorrhœal discharges.

Other Uses of this Plant.—The *wood* of *Nectandra Rodiæi*

is very hard and durable, and is therefore very valuable for shipbuilding, and other purposes. The Indians in case of scarcity of provisions also use the *seeds* of this plant in the preparation of a kind of bread. For this purpose they reduce them to a pulp, from which the bitterness is removed by repeated washings with water; this is then mixed with about one third part of its bulk of a decayed astringent wood, powdered, and sifted, or a like quantity of pressed cassava pulp, and the whole baked into bread.

Per. Mat. Med., vol. ii, pt. 1, p. 467; Per. Mat. Med., by B. & R., p. 558; Pharmacographia, p. 481; U. S. Disp., by W. & B., p. 573; Garr., Mat. Med. and Therap., p. 344; Maclagan, Trans. Royal Society of Edinburgh, vol. xv, p. 423, 1843; Flückiger, in Pharm. Journ., ser. 2, vol. xi, p. 192; Maclagan and Gamgee, in Pharm. Journ., ser. 2, vol. xi, p. 19; Pocklington in Pharm. Jl., ser. 3, vol. iii, p. 581.

DESCRIPTION OF PLATE.

The flowering specimen from one collected by Rodie in the Kew Herbarium; the fruit from a specimen in the British Museum collected by Schomburgk.

1. A branch with leaves and flowers.
2. Diagram of flower.
3. A flower.
4. Base of flower cut vertically.
5. An outer, and—6. An inner stamen.
7. Fruit.
8. Transverse section of the same.
9. A seed with one cotyledon removed.

(3–6 enlarged.)

D Blair FLS ad sicc del et lith.

M & N. Hanhart imp.

SASSAFRAS OFFICINALE, *Nees*

N. Ord. LAURACEÆ.

Tribe *Oreodaphneæ*.

Genus Sassafras,* *Nees*. Meissner, in DC. Prod., xv, pt. 1, p. 170. Species 2, natives of N. America.

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220. Sassafras officinale, *Nees, Syst. Laurin., p.* 488 (1836).

Sassafras.

Syn.—Laurus Sassafras, *Linn.*

Figures.—Woodville, t. 234; Bigelow, t. 35; Steph. & Ch., t. 126 (bad); Nees, t. 131; Hayne, xii, 19; Berg & Sch., t. 5 e.

Description.—A tree of 20—40 feet high or more, much branched, branches slender, cylindrical, with smooth, orange-brown bark; buds covered by large, blunt, red scales. Leaves alternate, without stipules, on petioles about 1 inch long, blade 3—7 inches long, broadly oval and undivided or very deeply divided into 3 nearly equal spreading lobes, wedge-shaped at the base, subacute at the apex, entire, rather thick, glabrous when mature, very strongly silky especially beneath when young, bright green, rather paler and with the veins prominent beneath, especially the two basal ones, which, with the midrib, give a somewhat triplinerved character to the leaf. Flowers rather small, unisexual, dicœcious, long-stalked, arranged in small, somewhat drooping racemes not an inch long, on peduncles of about the same length from the axils of the bud-scales, and appearing with the young leaves; rachis silky, bracts linear, longer than the pedicels, yellow, hairy. Male flowers:—Perianth very deeply cut into 6 obovate-oblong, very obtuse, spreading segments (which are deciduous, leaving the short tube behind), thin, hairy, pale greenish-yellow; stamens 9, equal, hypogynous, in three rows, a little shorter than the perianth, the inner 3 with a double stalked gland at the base, all with hairy filaments thickened upwards, and large, oblong, introrse, 4-celled anthers, with valvular dehiscence; pistil rudi-

* *Sassafras*, the name applied to the tree by the Spanish botanist, Monardes, in the 16th century.

mentary. Female flowers:—Perianth as in the male; stamens represented by 6 small, cordate, stalked staminodes; ovary 1-celled, style slender, tapering, shorter than the perianth, stigma trifid. Fruit ovoid, about the size of a pea, smooth, blue, surrounded at the base by the enlarged dull-red perianth-tube, and supported on the erect thickened pedicel, succulent. Seed solitary in the upper part of the pulp; cotyledons large, plane-convex; radicle minute, immersed; no endosperm.

Habitat.—The Sassafras tree is common in woods with a rich soil in Canada and the United States of America, as far south as Missouri and Florida. Its inconspicuous flowers appear in March and April with the young foliage, and are succeeded by the more remarkable berry-like fruit, and singularly diverse leaves.

As might be supposed this is quite hardy in our climate, and was cultivated in England as far back as the time of Gerard, but it is now rarely seen even in botanic gardens.

A. Gray, Man. Fl. N. U. States, p. 423; Chapman, Fl. South. States, p. 394; Hook., Fl. Bor.-Amer., ii, p. 137; Meissner, in DC. Prod., xv, pt. 1, p. 171; Lindl., Fl. Med., p. 338.

Official Parts and Names.—Sassafras Radix; the dried root (B. P.). The dried root (I. P.). 1. Sassafras; the bark of the root: 2. Sassafras Medulla; the pith of the stems (U. S. P.).

Production and Commerce.—Sassafras root, bark, pith, and oil, are the produce of the United States; the principal mart for them being Baltimore, to which they are brought from different parts of Maryland, and other States of the Union. The roots after being drawn from the earth are sent into the market partly without, and partly with, their bark; or they are cut up into chips, and the oil distilled from them where they are collected. The pith is principally derived from the branches and twigs; and is said to be most valuable if obtained in the autumn after a frost. The bark should also be collected late in the autumn, or in the spring before the leaves appear.

1. Sassafras Radix; Sassafras.—The entire root, as already noticed, is official in the British Pharmacopœia; but in the Phar-

macopœia of the United States the bark only of the root is recognised.

General Characters and Composition.—Sassafras root is imported in large branched pieces, which are generally more or less covered with bark, and frequently having attached to them a portion of the lower part of the trunk. The latter being almost inert should be removed before the root is cut into chips or shavings, in which condition it is usually found in the pharmacies. The wood is soft, light in weight, of a dull greyish-red or brownish-red colour, with an agreeable aromatic odour, and an aromatic, somewhat bitterish, astringent taste. It is covered with a dull brownish-grey, spongy, rough bark.

The bark of the root when separated for use, as directed in the Pharmacopœia of the United States, is commonly found in small, flattish or curled, irregular-shaped fragments. The pieces are more generally found without the corky layer, which, being inert, has been removed, thus leaving a scarred outer surface; such pieces rarely exceed a quarter of an inch in thickness, and are commonly much less. In other specimens the brownish-coloured, rough, corky, outer layer is partially or wholly, left on the pieces of bark. The bark divested of its corky layer has a reddish-brown or rusty-brown colour; it is brittle, and the freshly-fractured surface presents a lighter colour than the portions which have been long exposed; in fact, the bark generally becomes darker by age. The inner surface has a glistening appearance from the presence of small crystals. The bark resembles the wood in taste and odour, but these qualities are more evident, and the bark is to be regarded as preferable to the wood for medicinal purposes.

Sassafras owes its properties essentially to the presence of a *volatile oil,* of which from 1 to 2 per cent. may be obtained from the wood; the varying amount being in a great measure due to the proportion of bark it contains, for the bark yields at least twice as much oil as the wood. When fresh oil of Sassafras is colourless or pale yellow, but it becomes reddish by age. It is one of the heaviest of the volatile oils, varying from 1·087 to 1·094, accord-

ing to its age. In odour it resembles the bark and wood, and has a pungent, aromatic taste. It is slightly dextrogyrate, and boils at 439°. When kept for a long time, or when exposed to a low temperature, it deposits four- or six-sided prisms of *sassafras camphor*, which retain the odour of the oil. The researches of Grimaux and Ruotte show that oil of sassafras is essentially composed of about $\frac{9}{10}$ths of its weight of a liquid called *safrol*, which has a fennel-like odour, and has been since found by Arzruni to be identical with sassafras camphor; and another constituent called *safrene* with a similar odour. Oil of Sassafras is official in the Pharmacopœia of the United States; but it is not recognised in the British Pharmacopœia, or the Pharmacopœia of India. Sassafras root, more especially the bark, also contains *tannic acid*, and about 9 per cent. of a red colouring substance called *sassafrid*, which appears to be analogous to cinchona-red and ratanhia-red.

Medical Properties and Uses.—Sassafras root and bark, especially the latter, have aromatic, stimulant, and diaphoretic properties. Sassafras is very rarely given alone, but usually in combination with sarsaparilla and guaiacum, in chronic rheumatism, skin diseases, and syphilitic affections.

The oil also possesses similar properties, and may be accordingly used for like purposes. In the United States the oil is likewise employed for flavouring effervescing drinks and tobacco, and in the preparation of toilet soaps.

2. Sassafras Medulla.—Sassafras pith is only official in the Pharmacopœia of the United States. It is found in slender cylindrical pieces, which are very light and spongy, with a slightly mucilaginous taste, and when fresh a feeble flavour of sassafras. It forms a limpid mucilage with water. This mucilage may be prepared by adding sixty grains of the pith to a pint of boiling water; it is not sufficiently tenacious for use in the suspension of insoluble substances like the mucilage of gum arabic, from which it also differs in remaining limpid when alcohol is added to it.

This mucilage is much employed in the United States as a

demulcent application in inflammatory affections of the eyes; and as a soothing drink in catarrhal and other diseases where demulcents are useful.

Per. Mat. Med., vol. ii, pt. 1, p. 462; Pharmacographia, p. 483; U. S. Disp., by W. & B., pp. 784 & 1312; Procter, in Proc. Amer. Pharm. Assoc. (1866), pp. 211—222; Grimaux and Ruotte, Comptes Rendus (1869), p. 928; Spruce, in Hooker's Journ. of Bot., vol. vii (1855), p. 278; Sharp, in Amer. Journ. of Pharm., Jan., 1863, p. 53; Procter, in Amer. Journ of Pharm., Nov., 1866, p. 490; Amer. Journ of Pharm. (1871), p. 278; Proc. Amer. Pharm. Assoc. (1877), vol. xxv, from N. Rep. Ph., No. 10, 1876, p. 615.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in Ohio by Doubleday.

1. Branch of a male tree in flower and early leaf.
2. A male flower.
3. Section of the same.
4. One of the inner stamens.
5. A female flower.
6. Section of the same.
7. Ovary and stigma.
8. Staminode.
9. Branch with ripe fruit and developed foliage.
10. Perianth-tube.
11. Fruit.
12. Vertical section of the same.
13. Embryo.
14. Transverse, and—15. Vertical section of the same.

(2–8 enlarged.

D.Blair, ad nat. del. et lith.

M.& N.Hanhart imp.

LAURUS NOBILIS, *Linn.*

N. Ord. Lauraceæ.

Tribe *Laurineæ*.

Genus Laurus,* *Linn.* Meissner, in DC. Prod., xv, pt. 1, pp. 233–240. Species 2, one Mediterranean, the other Canarian.

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221. Laurus nobilis, *Linn., Sp. Plant., ed.* 1, *p.* 369 (1753).

Bay. Sweet Bay. True Laurel.

Figures.—Woodville, t. 235; Steph. & Ch., t. 125; Nees, t. 132; Hayne, xii, t. 18; Berg & Sch., t. 5 f; Fl. Græca, t. 365; Reichenb., Ic. Fl. Germ., xii, t. 673; Nees, Gen. Fl. Germ.

Description.—A much-branched shrub or small tree, sometimes reaching 25 feet or even more, with a smooth, olive-green or reddish bark, young twigs glabrous. Leaves very numerous, evergreen, alternate, without stipules, shortly stalked, 3—4 inches long, lanceolate, acute and tapering at both ends, the margin quite entire and usually more or less wavy, smooth, thick, shining, paler and strongly veined beneath, and covered with small immersed glands. Flowers unisexual, dicœcious, small, on smooth pedicels, arranged in small, umbellate, stalked clusters of (usually) 5, surrounded by an involucre of blunt, concave, reddish bracts, which enclose the umbel when in bud, peduncles stout, curved, a pair coming off opposite one another from a very short axillary branch. Male flowers:—perianth divided almost to the very base into 4 oval-oblong, broad, blunt, membranous, spreading, imbricate, yellowish-white divisions, minutely dotted with glands; stamens 12 in three rows of 4, smooth, the outer row alternating with the perianth-segments, a little longer than the rest, the other two rows with two small stalked, cordate, yellow "glands" near the base of the filaments; anthers oval, 2-celled, introrse, opening by valves which hinge at the top; no trace of a pistil. Female flowers:—perianth as in the male; androœcium represented by 4 oblong, cordate, apiculate, stalked, fleshy, veined

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* *Laurus*, the classical name for the tree; in Greek, Δάφνη.

staminodes, varying in form, alternate with the perianth segments; ovary ovoid, about as long as the staminodes, one-celled, with a single pendulous ovule, style simple, cylindrical, a little shorter than the ovary, stigma thickened, faintly 3-lobed. Fruit succulent, ovoid, scarcely ¾ inch long, purplish-black, smooth, pulp scanty. Seed solitary, pendulous, the funicle running up one side to the summit, testa chartaceous, cotyledons large, plane-convex, oily, radicle small, included, superior; no endosperm.

Habitat.—The classical Bay is found wild in most parts of Asia Minor and Syria; it grows also throughout the countries surrounding the Mediterranean, and is abundant in Greece, Italy, and Southern France; it is, however, generally considered to have gradually spread from the East. In this country it is a garden plant, where it has been cultivated for centuries. Male trees are apparently much more frequent here than female. The flowers are copiously produced in early spring, and the nearly black sloe-like fruit is ripe in October and November.

The leaves vary a good deal in width and amount of crisping at the edges, and five varieties are distinguished by Meissner on these characters. Our figure represents them more undulated than is usual.

The name Laurel has been completely transferred from this to *Prunus Laurocerasus* (see No. 98). The word Bay commonly applied to the present tree is no doubt the same as the French *baie*, berry, and was originally used for the fruit, now tautologically called "Bay-berries."

Gren. & Godr., Fl. France, iii, 64; Bertoloni, Fl. Ital., iv, p. 399; Meissner, in DC. Prod., xv, 1, p. 233; Lindl., Fl. Med., p. 340.

Parts Used and Names.—Lauri Fructus et Folia; the fruit and leaves. They are not official in the British Pharmacopœia, or the Pharmacopœia of India, or the Pharmacopœia of the United States; but the fruits were formerly official in this country.

1. The Fruit.—The fruits which are commonly called *Bay Berries*, as seen in a dried state in commerce, are oval in form, and consist of a thin, brittle, blackish-brown, more or less wrinkled pericarp; enclosing a solitary, loose, firm, oval seed, which is

readily separated into two equal lobes. This seed has a bitter aromatic taste, and an agreeable aromatic odour. The fruits have been sometimes confounded with Cocculus Indicus, from which, however, they are readily distinguished, as described by us under *Anamirta paniculata.*

The properties of these fruits essentially depend upon a fragrant *volatile oil,* which may be obtained from them by distillation with water; and a *concrete fixed oil* of a greenish colour. The latter oil, which is known in commerce as *Oil of Bays,* is imported from the south of Europe. It may be obtained from either the fresh or dried fruits by expression and heat; but it is chiefly derived from the former. It is a mixture of volatile oil and fatty bodies, like the expressed oil of nutmeg described under *Myristica fragrans.* Oil of Bays has a butyraceous consistence, a greenish colour, and an aromatic odour, like that of the seeds. It is completely soluble in ether; but only partially so in cold alcohol.

2. The Leaves.—These have an agreeable aromatic odour; and an aromatic, bitterish, somewhat astringent taste. Their properties depend essentially upon the presence of a *volatile oil,* which is readily obtained from them by distillation with water. These leaves must not be confounded with those of the poisonous cherry-laurel already noticed under *Prunus Laurocerasus.*

Medical Properties and Uses.—Both leaves and fruits possess aromatic and stimulant properties, and have been reputed narcotic. The leaves are also said to be diaphoretic, and in large doses emetic. Both leaves and fruits were employed formerly in flatulent colic, hysteria, amenorrhœa, and other affections; but they are rarely or ever used internally at the present time, either in this country or elsewhere. Externally, however, the commercial oil of bays is sometimes employed as an external stimulant application in sprains, bruises, &c. But its principal use is in veterinary medicine.

The leaves are frequently used by the cook and confectioner as a flavouring agent. The volatile oil is also sometimes employed in perfumery.

Per. Mat. Med., vol. ii, pt. 1, p. 464; U. S. Disp., by W. & B., p. 1629; Steph. & Church., Med. Bot., by Burnett, vol. ii, pl. 125.

DESCRIPTION OF PLATE.

Drawn from a specimen in Kew Gardens, flowering in May; the female flower and fruit from a Corsican specimen in the British Museum.

1. Branch with flowers from a male plant.
2. The inflorescence.
3. A male flower.
4. Stamens.
5. A female flower.
6. Section of the same.
7. A staminode.
8. Ripe fruit.
9. Transverse section of the same.
10. Embryo with one cotyledon removed.

(2–7 enlarged.)

D.Blair F.L.S. ad nicc. del. et lith.

M & N Hanhart Imp.

CINNAMOMUM CAMPHORA, *Nees & Eberm.*

N. Ord. LAURACEÆ.

Tribe *Laurineæ*.

Genus Cinnamomum,* *Burman.* Baill., Hist. Pl., ii, p. 468; Meissner, in DC. Prod., xv, pt. 1, pp. 9—27. Species over 50, natives of tropical and subtropical Asia.

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222. Cinnamomum Camphora,† *Nees and Eberm., Handb. d. Med.-Pharm. Bot.* i, *p.* 430 (1830).

Camphor. Camphor Laurel.

Syn.—Laurus Camphora, *Linn.* Camphora officinarum, *Nees.* Cinnamonum inunctum, *Meisn.?* C. glanduliferum, *Meisn.?*

Figures.—Woodville, t. 236; Nees, t. 130; Hayne, xii, t. 27; Berg & Sch., t. 10 e; Wight, Ic. Plant. Ind. Or., t. 1818.

Description.—A rather large tree reaching a height of 30 feet, with long terete branches spreading horizontally; bark smooth, green, and shining on the younger branches; leaf-buds with stiff scales, conical, glabrous. Leaves numerous, alternate, without stipules, evergreen, petioles slender, weak, about an inch long, often curved downwards at the base, blade 3—6 inches long, oval, usually much attenuated at both ends, acuminate, entire, with the margin somewhat cartilaginous, smooth, bright green, and highly polished above, pale green and covered with a whitish glaucous "bloom" beneath, very stiff, thick but scarcely leathery, the two lowest lateral nerves strong and prominent, running for some distance parallel to the edges, and so giving a triplinerved character to the leaf, each with a depressed punctate gland in the axil, which is prominent on the upper surface. Flowers very small, on slender, divaricate pedicels, forming little spreading cymes of 2 or 3, arranged in small, erect, long-stalked axillary panicles shorter than the leaves. Perianth with a short, campanulate, very thick,

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* *Cinnamomum*, the κιννάμωμον of the Greeks, a word said to be of Phœnician origin.

† *Camphora*, the mediæval name of the drug, from the Arabic Kafur or Capur.

fleshy tube, and usually 6 imbricate, nearly equal, blunt, thick, horizontally spreading segments, smooth externally, densely hairy within, greenish-white, afterwards breaking away from the tube. Androœcium of nine stamens and (usually) 6 staminodes; stamens erect, shorter than the perianth-segments, the 6 outer opposite to them, introse, the 3 inner opposite the outer segments, extrorse and provided at the base on either side with a large, stalked, thick obcordate "gland," filaments hairy, anthers large, oblong, 4-celled, with valvular dehiscence; staminodes in two rows, stalked, oblong or sagittate, the outer 3 with two "glands" at the base, like those of the inner stamens. Ovary surrounded by the perianth-tube but free from it, 1-celled, with a single descending ovule, style slender, as long as the stamens. Stigma small. Fruit ovoid, the size of a large pea, smooth, usually purplish, surrounded at the base by the enlarged persistent perianth-tube. Seed solitary.

Habitat.—The Camphor tree inhabits Japan and Formosa, in both of which large insular countries it is common and widely diffused, extending in the latter up to an elevation of 2000 feet in the hills. It is also abundant in Central China. It flowers in June and July and the fruit is ripe in November and December. The tree has now become familiar in the tropical and warmer temperate countries of the world, as in Mauritius, the Cape of Good Hope, Brazil, Jamaica, Madeira, and the Mediterranean region. It is not uncommon in greenhouses in this country (having been first so grown by Miller in 1727), where, however, it rarely flowers, but is very ornamental from its glossy, stiff, ivy-like evergreen leaves, which when young are tinged with a deep salmon colour. They vary a good deal in form, some trees having them broad and rounded, others long and attenuated; the colour of the fruit is also described as being either yellow, red, or purple. If *C. inunctum* and *C. glanduliferum* are rightly to be considered as varieties, the range of the species extends to Burmah and Nepal.

The source of Borneo camphor is a tree belonging to the very different natural order, *Dipterocarpaceæ*, *Dryobalanops aromatica*

Gaertn. (D. Camphora, *Colebr.*), a gigantic tree inhabiting Borneo (including Labuan) and Sumatra. It is figured in Hooker's Journal of Botany for 1852, tt. 7, and Hayne, xii, t. 17 (after Colebrooke).

Meissner, in DC. Prod., xv, pt. 1, p. 24; Franchet & Savatier, Prod. Fl. Japon., p. 411; Lindl., Fl. Med., p. 333.

Official Part and Name.—Camphora; a concrete volatile oil obtained from the wood of Camphora officinarum, *Nees;* imported in the crude state, and purified by sublimation (B. P.). The concrete volatile oil obtained from the wood by sublimation (I. P.). Camphora; a peculiar concrete substance derived from Camphora officinarum, *Nees,* and purified by sublimation (U. S. P.).

1. Crude Camphor.—*Varieties, Preparation, General Characters, and Commerce.*—Camphor is exclusively derived from the island of Formosa and Japan, the former being known in commerce as *China* or *Formosa Camphor,* and the latter as *Japan* or *Dutch Camphor.*

a. China or *Formosa Camphor.*—This camphor is obtained from the wood by first cutting it into chips, which are exposed to the vapour of boiling water, and the camphor as it volatilises with the steam is then collected. The process is conducted as follows :—A long wooden trough, with a coating of clay in order to protect it, is fixed over a furnace. Water is then poured into it; and over it a board perforated with numerous small holes, is luted. The chips are placed above these holes, and covered with earthen pots; then a fire being lighted in the furnace, the water becomes heated, and as the steam rises it passes through the holes and the chips, carrying with it the camphor vapour, which condenses in the upper part of the pots, from which it is scraped out every few days. The camphor is then forwarded to Tamsui, the principal port of Formosa, and to a trifling extent also to Takow, in baskets holding about 70 pounds each, lined and covered with large leaves. In the ports it is either stored in large vats; or packed in square chests or tubs lined with lead or tinned iron, each containing about 100 lbs., and

then exported. But before shipment water is poured into the cases, in order, it is said, to lessen the evaporation of the camphor. When the camphor is stored in vats, a brownish-yellow volatile oil, called *camphor oil*, drains out. This oil holds in solution a good deal of camphor, which on a slight reduction of temperature is deposited in a crystalline form. Camphor oil is used by the Chinese in rheumatism, &c. The crude camphor as it arrives in Europe and America, is in small crystalline grains of a greyish-white or light brown colour, which cohere more or less into irregular friable masses of varying sizes. This camphor is always wet when it arrives, from the water, as already noticed, which is poured over it before exportation.

b. Japan or *Dutch Camphor.*—Japan camphor is said to be obtained by placing the chips of wood in water in a large iron pot, covered with an earthen head with a lining of rice-straw. A moderate heat is then applied, and as the steam rises it carries with it the volatilised camphor, which condenses upon the straw, from which it is afterwards collected. It is exported packed in double tubs, one being placed within the other, and having no metal lining as in the case of Formosa camphor; each tub holds about 1 cwt. It is in larger grains than Formosa camphor; these grains are also lighter in colour, and usually have a pinkish tint. Japan camphor is also cleaner and drier than Formosa camphor, and fetches commonly a higher price than it. The grains by their cohesion form masses of various sizes and shapes.

Refining.—As crude camphor contains from 2 to 10 per cent. of impurities, consisting of fragments of vegetable matter, gypsum, common salt, and sulphur, it is directed in the pharmacopœias to be purified by sublimation, before being used in medicine. The process of refining varies somewhat in different districts, but it consists essentially in subliming the crude camphor previously mixed with a little quick-lime, iron filings, sand, or charcoal; and is either conducted in a glass or iron vessel, or sometimes, as in India, in one made of copper. In this country the sublimation is usually effected in very thin flint glass vessels, of an oblate-spheroidal shape, and furnished with a short neck;

these are called *bombaloes*. The vessels being charged, commonly with a mixture of crude camphor and about one fiftieth of lime, are placed in a sand bath, and heated rapidly, with the view of driving off the water, to a temperature of from about 250°—375°, after which the heat is very slowly raised to about 400°, and maintained at that point for twenty-four hours. The bombaloes are then removed, and the camphor finally obtained from them by their fracture. As thus prepared refined camphor is in the form of concavo-convex cakes or bowls, about 10 inches in diameter, 3 inches in thickness, and from 9—12 lbs. in weight; but these dimensions vary somewhat according to the manufacturer. Each cake is perforated by a round hole at its bottom, corresponding to the opening in the neck of the vessel in which the sublimation has taken place. The lime is said to act by removing any trace of resin or empyreumatic oil from the crude camphor; and also by combining with the moisture present, which would otherwise interfere with the proper condensation of the camphor vapour. Great care is requisite during the process of sublimation, from the inflammable character of the vapour; and in order to prevent its condensation in loose crystals, instead of compact cakes as desired, the temperature must be very carefully regulated.

2. Refined Camphor.—*General Characters and Composition.* Refined camphor, which is *alone official*, is solid at ordinary temperatures, colourless, translucent, crystalline, soft; and although somewhat tough, it can, when in mass, be readily broken into pieces when struck, as it presents numerous fissures, and may even be readily powdered, if moistened with spirit of wine, ether, or chloroform, or when an equal weight of sugar is added to it. It has a powerful penetrating odour, and a pungent, somewhat bitter taste, followed by a sensation of cold; it floats on water, melts at 347°, boils at 400°, sublimes entirely when heated, and volatilises somewhat rapidly, even at ordinary temperatures, when it is deposited in hexagonal plates or prisms. Camphor is but very slightly soluble in water, 1300 parts of the latter only dissolving about one of the former; but it is very soluble in alcohol, ether, chloroform, acetic acid, and the volatile and

fixed oils. When small lumps of camphor are thrown on water, they exhibit a rotatory motion, which appears be due to the slight solubility of camphor, combined with its power of volatilising at ordinary temperatures. Camphor burns readily with a bright smoky flame. Its specific gravity varies according to the temperature, thus from 32° to 42°, it is about that of water, while at from 50° to 54°, it is only 0·992. When in a melted state, or in a concentrated solution, camphor is dextrogyrate; but in the form of a weak solution, it has no rotatory power.

Camphor belongs to the class of *stearoptenes* or *concrete volatile oils;* its formula is $C_{10}H_{16}O$. When repeatedly distilled with anhydrous phosphoric acid or chloride of zinc it is converted into *cymol*, $C_{10}H_{14}$, a substance contained in, or obtainable from, many volatile oils. When heated with nitric acid, camphor is slowly oxidised, and passes into crystallised *camphoric acid.*

Medical Properties and Uses.—In medicinal doses camphor is regarded as stimulant and antispasmodic, and is probably also antipyretic. In large doses it is an acro-narcotic poison. Camphor also possesses antiseptic properties; and when locally applied it is stimulant and anodyne. It has likewise been commonly regarded, although apparently without any real foundation, as an anaphrodisiac. Camphor has been administered in numerous diseases, and is a useful remedy in adynamic fevers and inflammation; choleraic diarrhœa; in various spasmodic affections, such as hooping-cough, epilepsy, chorea, asthma, angina pectoris, and puerperal convulsions; in various forms of hysteria; palpitation; in affections of the genito-urinary system, as dysmenorrhœa, spermatorrhœa, chordee, &c. It has been found useful by Dr. Ringer in irritable conditions of the nasal mucous membrane, when attended with much sneezing and frontal headache. It has likewise been used, but with conflicting or doubtful results, in chronic gout and rheumatism, and in other diseases; and as an antidote to poisoning by strychnia. Externally applied in the form of a strong spirituous solution, or dissolved in olive oil, it is a useful, stimulant to stiff and painful parts, and is much used in chilblains, rheumatism, neuralgic affections, sprains, bruises, &c. It is also

a serviceable application for preventing bed sores; and in skin diseases for allaying pruritus. A preparation known as monobromated camphor has, of late years, been recommended for use in medicine.

Other Kinds of Camphor.—Besides the official camphor, other kinds have been also described by pharmacologists. Thus *Borneo, Malayan,* or *Sumatra camphor,* from *Dryobalanops aromatica,* Gärtn; and *Ngai* or *Blumea camphor,* from *Blumea balsamifera,* DC., are amongst the more important of these camphors; but for their description we must refer our readers to special works on materia medica. An artificial camphor can also be made by passing hydrochloric acid gas through oil of turpentine.

Kämpfer, Amœnitates Exoticæ (1712), p. 772; Per. Mat. Med., vol. ii, pt. 1, p. 449; Per. Mat. Med., by B. & R., p. 548; Pharmacographia, p. 460; U. S. Disp., by W. & B., p. 202; Watts, Dict. of Chem., vol. i, p. 727; Gmelin, Chemistry, vol. xiv, p. 338; Royle, Mat. Med., by John Harley, p. 452; Pharm. Journ., ser. 2, vol. v, p. 280; Perret, Journ. de Pharm. et de Chemie, Fev., 1868, p. 124; Pharm. Journ., ser. 3, vol. iv, p. 829; Maisch, in Pharm. Journ. ser. 3, vol. iii, pp. 201 & 221, from Amer. Journ. of Pharm. for 1872, p. 84; Gault, in Pharm. Journ., ser. 3, vol. v, p. 321, from L'Union Pharmaceutique, vol. xv, p. 266; Plowman, in Pharm. Journ., ser. 3, vol. iv, p. 710; Hooker, Journ of Bot., vol. iv, p. 33; Thiselton Dyer, in Trimen's Journ. of Bot., vol. iii, N. S., p. 98.

DESCRIPTION OF PLATE.

Drawn from a tree in the Royal Gardens, Kew, the flowers added from a specimen in the British Museum cultivated in Mauritius, the fruit added from Berg and Schmidt.

1. A branchlet with flowers.
2. A flower.
3. Vertical section of the same.
4. Diagram of flower.
5. An outer stamen.
6. An inner stamen.
7. An outer staminode.
8. An inner staminode.

9—11. Fruit with enlarged perianth-tube.

(2, 3, 5-8 enlarged.)

D.B. ait F.L.S. ad nat. del. et lith.

Hanhart imp.

CINNAMOMUM CASSIA, *Blume*.

N. Ord. Lauraceæ.

Tribe *Laurineæ*.

Genus Cinnamomum, *Burman*.

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223. Cinnamomum Cassia,* *Blume, Bijdragen Fl. Nederl. Indie*, ii, p. 570 (1825).

Cassia. Chinese Cinnamon.

Syn.—C. aromaticum, *Nees*. Laurus Cassia, *Ait.*

Figures.—Nees, t. 129, cop. in Woodville, vol. v; Hayne, xii, t. 23; Berg & Sch., t. 5 d (*C. aromaticum*); Bot. Repos., t. 595, cop. in Wight, Ic. Fl. Ind. Or., i, t. 136; Bot. Mag., t. 2028 ?

Description.—A handsome tree of moderate size, with the younger branches somewhat tetragono-compressed; bark thick, smooth, pale, young twigs finely tomentose, buds smooth. Leaves evergreen, sub-opposite or alternate, 5—9 inches long, petiole about ½ inch, blade oval-oblong, tapering at base, acute or obtuse at apex, quite entire, very smooth, shining and green above, dull and glaucous with a very minute tomentum beneath, strongly 3-nerved, the nerves impressed above, very prominent beneath, the two lateral ones united with the midrib for a short distance from the base, and reaching the apex of the leaf, transverse connecting veins very numerous. Flowers small, stalked, without bracts, arranged in threes and forming small cymose panicles at the end of long axillary and terminal peduncles; peduncles and pedicels finely tomentose or sub-glabrous. Perianth pubescent on both surfaces, rather smaller than in *C. zeylanicum*, and with the segments more obtuse. Androœcium and pistil as in that species. Fruit broadly oblong-oval, apiculate, fleshy, shining, black, surrounded at the base by a cup formed by the persistent base of the perianth, which is narrowed below, transversely wrinkled, and has a thick, eroso-dentate margin. Seed

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* *Cassia* or κασία, the classical name of the bark (see also under No. 87).

filling the fruit, cotyledons large, plane-convex, radicle small, superior, no endosperm.

Habitat.—This species has been long cultivated in Java, to which island it was introduced from China. In the southern part of that vast country it is also a cultivated plant, but doubtfully a native there. M. Thorel recently met with what he considers true *C. Cassia* in Laos, and believes that it is found wild only there and in Cochin China, and not in China proper, to which country the bark is imported. Kurz gives Ava also for this species, but from the description his plant seems different.

The flowers are produced in January—March. The plant has been long cultivated in our stoves, but we have not seen it in flower; the young leaves are very ornamental, being of a bright wine-red with pale green veins. The fruit is said by M. Thorel to be as large as a small olive.

Though it is probable that this species affords Chinese Cassia, the fact has never been proved. Various other allied species possess barks of similar properties, but it has not yet been possible, in the absence of authentically matched specimens, to refer the different commercial varieties to their correct botanical source. Moreover, the species have been unduly multiplied by descriptive botanists and are very confused and ill-defined. The following are some of those which probably afford kinds of Cassia lignea and Cinnamon:—*C. Sintok*, Blume, figured in Hayne, xii, t. 24, a native of Java and Sumatra; *C. obtusifolium*, Nees, found in East Bengal, Assam, Burmah, &c., perhaps not distinct from *C. zeylanicum*; *C. Cutilawan*, Blume, from the Moluccas, figured in Hayne, xii, tt. 24, 25 (of which *C. rubrum*, Blume, is considered by Meissner to be a variety); *C. Loureirii*, Nees, a native of Cochin China and Japan; *C. Burmanni*, Blume, figured in Wight, Ic. Fl. Ind. Or., t. 138; *C. pauciflorum*, Nees, from Silhet and Khasya; *C. Tamala*, Nees & Eberm., figured in Hayne, xii, t. 26 d, and Blume, Rumphia, t. 14, with a wide range from the E. Himalayas to Burma, and also found in Queensland, Australia; *C. iners*, Reinw., a very variable plant with numerous synonyms, figured in Blume, Rumphia, tt. 13, 17, 18; Hayne, xii,

t. 22, Wight, Ic. Fl. Ind. Or., t. 122 &c., which is not considered to be specifically distinct from *C. zeylanicum* by Thwaites and Kurz.

Meissner, in DC. Prod., xv. pt. 1, p. 12; Brandis, Forest Fl. India, p. 374; Kurz, Forest Fl. Burma, ii, p. 288; De Lanessan, Hist. des Drogues, ii, pp. 241, 672; Lindl., Fl. Med., p. 330; Fl. & Hanb., Pharmacogr., p. 474.

Official Part and Names.—CINNAMOMUM; the prepared bark of Cinnamomum zeylanicum, *Nees*, and of Cinnamomum aromaticum, *Nees* (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India; but it was formerly recognised in both the Edinburgh and Dublin Pharmacopœias. Wood and Bache in the United States Dispensatory, remark, that "the United States Pharmacopœia embraces under the title of cinnamon, not only the bark of that name, obtained from the island of Ceylon, which is the only variety recognised in the British Pharmacopœia, but also the commercial cassia, which is imported from China; and as the two products, though very different in price, and somewhat in flavour, possess identical properties, and are used for the same purposes, there seems to be no necessity for giving them distinct official designations." The official cinnamon bark of the British Pharmacopœia and of the Pharmacopœia of India is described under *Cinnamomum zeylanicum;* the bark now to be noticed is distinguished in commerce under the names of *Cassia bark* and *Cassia lignea.* The idea formerly current that cassia bark was only coarse cinnamon bark, obtained from the roots and large branches of *Cinnamomum zeylanicum,* is altogether erroneous; and is, indeed, at once disproved, from the fact, that *Cassia lignea* is never imported from Ceylon, whence our official cinnamon is derived.

Production, Preparation, Varieties, and Commerce.—Nothing certain is known as to whether the finest kind of Cassia, which is obtained from the southern provinces of China, is derived from cultivated or wild plants, or from both; but that from Calcutta is collected from small-sized wild plants. Of the production of cassia bark from Sumatra, Java, &c., nothing is known. Moreover, we have no information of the mode in which Cassia

bark is collected and prepared for use in the several districts from whence it is derived; but it is evidently less carefully manipulated than Chinese cinnamon, as it does not consist, like it, of simply the inner bark, but also of a variable proportion of the middle bark or mesophlœum, and commonly also of portions of the corky layer or epiphlœum. Several commercial varieties of cassia bark have been distinguished under the names of the countries or districts whence produced or shipped, as *Chinese, Calcutta, Java, Timor, Padang* or *Sumatra,* and others. The best variety is the *Chinese,* which is exported in enormous and yearly increasing quantities from Canton; the less esteemed varieties are sometimes termed *Wild Cassia* or *Cassia vera.*

General Characters and Composition.—Chinese Cassia or *Chinese Cassia lignea,* is, as already stated, the best kind, and the one more commonly met with in Great Britain and the United States. On the Continent it is termed *Chinese Cinnamon;* and although derived, as we have seen, from a different plant and having a different geographical source, it is that variety which most nearly resembles Ceylon cinnamon. It may, however, be readily distinguished from Cinnamon by its thicker substance, coarser appearance, darker, browner, and duller colour, and its less sweet and delicate flavour, being more pungent than it, and somewhat bitter. It is also less closely quilled and breaks shorter than good cinnamon; the quills are also generally single, or rarely double, whereas those of Ceylon cinnamon are always compound. The outer coat has also been less carefully removed than that of Ceylon cinnamon, for it is not uncommon to find pieces of cassia bark with portions of the corky layer attached to them. Chinese cassia is imported in bundles of about twelve inches in length, which are tied together with slips of bamboo, and weigh about a pound.

The inferior kinds of Cassia bark vary very much in colour, flavour, and thickness; but commonly they are darker and thicker, being in some cases even a quarter of an inch. They have also a less agreeable cinnamomic flavour, and some are very mucilaginous or astringent.

The properties of cassia bark are especially due, like those of cinnamon, to the presence of a *volatile oil*, which is commonly distinguished as *Oil of Cassia;* it is exported in large quantities from Canton. Like that of oil of cinnamon it is chiefly composed of *Cinnamic Aldehyde*, together with some hydrocarbons; it is chiefly distinguished by it less delicate and agreeable odour and taste, and if derived from the inferior varieties of cassia, its odour is readily distinguished from oil of cinnamon by difference of character. Its colour is usually pale yellow; and, according to Flückiger and Hanbury, whilst oil of cinnamon is slightly levogyre, that of oil of cassia is feebly dextrogyre.

Cassia bark also contains *tannic acid*, hence its decoction is rendered blackish-green by a persalt of iron. *Starch* is another constituent, hence if tincture of iodine be added to a decoction of cassia, the latter becomes of an indigo-blue colour. *Mucilage* is also contained in cassia bark, more especially in the inferior varieties. This mucilage is soluble in cold water and the larger amount which is contained in the inferior kinds of cassia is one of the characters by which they may be distinguished from Chinese Cassia, as also from Ceylon cinnamon. Another ready means of distinguishing Cassia from Cinnamon is by the action of tincture of iodine, for while a decoction of cinnamon is not perceptibly coloured by iodine, a blue colour is at once produced when it is added to a decoction of cassia. This test was pointed out many years since by Dr. A. T. Thomson, but the cause of this difference of action by iodine on the two barks is not certainly known. Both barks contain starch, but cinnamon has some principle in addition, which destroys the blue colour of iodide of starch, for if a decoction of cassia bark rendered blue by iodine be added to a decoction of cinnamon bark, the blue colour disappears. Pereira conjectured that this modifying principle was tannic acid, but the experiments of Flückiger and Hanbury throw doubt on this. This test is of especial value, as by it a decoction of powdered cassia may be readily distinguished from one of powdered cinnamon.

Medical Properties and Uses.—The properties of cassia are

similar to those of cinnamon; but it is commonly regarded as somewhat more astringent. Its uses are the same as those of cinnamon, and are described under "Cinnamomum zeylanicum." Oil of Cassia has also similar properties to, and may be employed for like purposes as, Oil of Cinnamon.

Other Products of Cinnamomum Cassia.—The spice known as Chinese Cassia Buds is also supposed to be derived, at least in part, from the plant now under description. Cassia Buds are the dried unripe fruits, and consist essentially of the calyx closely surrounding the immature fruit. They have some resemblance to cloves, but are smaller and darker coloured, or to nails with round heads; they have the odour and taste of cassia bark. They are imported from Canton; the exports of late years have, however, considerably declined.

As a spice cassia buds have been known in Europe since the middle ages; and the authors of Pharmacographia state that, they were then used in preparing the spiced wine called Hippocras. Of late years they have been principally employed in confectionery, and by the perfumer in the preparation of Pot Pourri.

An inferior kind of Cassia Buds is also collected in Southern India, and is said to be the produce of *Cinnamomum iners*, Reinw. These fruits are more mature than the Cassia Buds of India; they are employed medicinally by the natives in diarrhœa, dysentery, and coughs.

Per. Mat. Med., vol. ii, pt. 1, p. 445; Pharmacographia, p. 474; Christison, Disp., p. 284; U. S. Disp., by W. & B., p. 312; Pharmacopœia of India, p. 195; Lind. Flor. Med., p. 330; Pharm. Journ., vol. xii, ser. 1, p. 602.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Kew Herbarium, from Dr. Hance, cultivated in South China; the flowers added from Hayne, the fruit after Berg and Schmidt. 1. A branchlet with undeveloped flowers. 2. Portion of a flower-panicle. 3. Perianth laid open. 4. Section of ovary, &c. 5. Fruit surrounded by its cup. 6. The same without the cup. 7. Vertical, and— 8. Transverse section of the same. (3, 4, 7, 8 enlarged).

M & N Hanhart imp

CINNAMOMUM ZEYLANICUM, Breyn.

N. Ord. Lauraceæ.
Tribe *Laurineæ*.
Genus Cinnamomum, *Burman*.

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224. Cinnamomum zeylanicum, *Breyn. in Ephem. Acad. Nat. Cur., Dec.* 1, *ann.* 4, *p.* 139, 140 (ex Hayne).

Cinnamon.

Syn.—Laurus Cinnamomum, *Linn. & many authors.* L. Cassia, *Burm. and other authors; not of Nees.*

Figures.—Steph. & Ch., t. 127; Nees, t. 128; Hayne, xii, tt. 20, 21; Berg & Sch., t. 5 c; Bot. Mag., t. 1636; Wight, Ic. Pl. Ind., tt. 123—128; Bedd., Fl. Sylv., t. 262 (*C. Wightii*, Meissn.).

Description.—An evergreen tree, usually of small size; bark pale-brown; the young twigs slightly quadrangular, smooth. Leaves opposite, spreading or drooping, stalked; the pedicels channelled above; blade 4-6 inches long, oblong-ovate, rounded at the base, bluntly acuminate at the apex, but often somewhat irregular in outline, coriaceous, shining, bright green above, glaucous beneath, with 3 or 5 strong nerves from the base, only the midrib reaching the apex, especially prominent beneath, connected by transverse anastomosing veins, entire. Inflorescence large, terminal, definite, panicled, much branched, the lower branches coming off from the axils of the upper leaves; ultimate branchlets di- or trichotomous; flowers rather distant, terminal, ebracteate. Perianth deeply divided into 6 oblong, rather blunt, equal lobes, imbricated in two rows, about $\frac{1}{4}$ inch long, finely downy outside, more densely so within; the upper half of the lobes usually breaking away by a transverse fission from the rest of the perianth. Androœcium consisting of 9 antheriferous stamens and 3 staminodes, perigynous, the outer whorl of 6 opposite the segments of the perianth, introrse, the inner whorl of 3 opposite the outer segments, extrorse and with a small, stalked, obcordate-conical "gland" on either side of the filament at its base, filaments hairy, short, anthers oval with 4 cells, 2 placed above

the others and smaller, each opening by a valve with its hinge above; staminodes opposite the inner perianth-segments, similar in form to the "glands" at the base of the inner stamens, but larger. Ovary superior, 1-celled, with a single pendulous, anatropous ovule; style shorter than the stamens; stigma bilobed. Fruit slightly fleshy, ovoid, more than $\frac{1}{2}$ inch long, smooth, surrounded at base by the enlarged, cup-shaped, truncate or 6-lobed perianth. Seed not filling the fruit, without endosperm; cotyledons large, plano-convex.

The above description applies to the form which is considered by botanists as the type of the species; but there are various cinnamon trees differing in height, in the form, size and texture of the leaves, and in other points. Meissner makes 6 varieties of the present species, and gives also many other allied species which have been described by various authors; but it is now generally considered (see Thwaites and Beddome) that many of these cannot be maintained as distinct, being united by chains of intermediate forms. Figures of several will be found in the works quoted above of Hayne, Nees, and Wight.

Habitat.—*C. zeylanicum*, as its name indicates, is a native of Ceylon, where it is general in forest districts, reaching to 3000 ft. in the hills, and is also very extensively cultivated in plantations, called "gardens." It has been introduced into India, Java, China, Senegal, Brazil, and the West Indies, but the bark yielded in those countries is deficient in aromatic qualities. It is a stove plant in England, where it has been cultivated since 1768 in botanic gardens; the panicles of flowers are small compared with naturally grown specimens.

Thwaites, Enum. Pl. Zeyl., p. 252; Meissner, in DC. Prod., xv, sect. 1, p. 13; Miquel, Fl. Ind. Batav., i, p. 898; Lindl., Fl. Med., p. 329.

Official Parts and Names.—Cinnamomi Cortex. The inner bark of shoots from the truncated stocks; Oleum Cinnamomi. The oil distilled from Cinnamon Bark (B. P.). The inner bark of shoots from the truncated stocks (*Cinnamomi Cortex*) (I. P.).

Cinnamomum. The prepared bark of Cinnamomum zeylanicum, *Nees*, and of Cinnamomum aromaticum, *Nees*; Oleum Cinnamomi. The volatile oil obtained from the bark of Cinnamomum zeylanicum, *Nees* (U. S. P.).

Production, Varieties, and Commerce.—The best cinnamon bark is imported from Ceylon, where it is obtained from the cultivated plant; this is distinguished in commerce as Ceylon cinnamon. Other well known varieties of cinnamon bark are the *Malabar* or *Tinnevelly*, *Tellicherry*, and *Java*, all of which are inferior to Ceylon cinnamon; but the Tellicherry is next in value to it, and sometimes but little inferior in quality. In Ceylon the cultivation of coffee is displacing that of cinnamon, and the exports are declining. The importations of cinnamon into this country from Ceylon are also much less than formerly, for while in 1869 2,611,473 lbs. were imported, in 1872 the quantity was only 1,015,461 lbs. In the latter year we imported 56,000 lbs. of cinnamon from other countries.

The principal cinnamon gardens or plantations of Ceylon are in the vicinity of Columbo, and their management is nearly similar to that of an oak-coppice in England. The plants are pruned so as to prevent their forming trees, but to cause them to produce stocks or stools, from which four or five shoots are allowed to grow. These shoots usually come to perfection at the age of from eighteen months to two years, when they are beginning to turn brown on their surface from the greenish epidermis becoming replaced by the production of a corky layer of bark. Such shoots, which are commonly from 6 to 10 feet high, and from ½ to 2 inches thick, are then cut off by a long sickle-shaped knife, called a *catty*, stripped of their leaves, and trimmed with a knife, the little pieces which are removed being kept and sold as *cinnamon chips*. The peeling is then effected by cutting through the bark transversely at distances of about a foot, and by making two opposite, or where the branch is thick, three or four longitudinal incisions to connect the transverse ones, and the bark is then readily removed by introducing the peeling knife termed a *mama* beneath it. The pieces of bark are then placed one within

the other, and the compound sticks thus produced are bound together into bundles. These are usually left for about twenty-four hours, when the two external layers of bark are carefully removed by scraping; for which purpose each quill is placed on a piece of wood of the required thickness. In a few hours the smaller quills are introduced into the larger ones, and in this way congeries of quills are formed, which generally measure about 40 inches in length. The bark is then kept one day in the shade, after which it is placed on wicker trays and dried in the sun; and finally it is made up into bundles weighing on an average about 30 lbs. each. Care is taken to fill up each pipe or congeries of quills with the same kind of bark as that which is outside, and as few joints are placed in each pipe as possible. The finest pipes are usually well filled, as the preservation of the odour and flavour is very much assisted by the exclusion of the air.

General Characters of Cinnamon Bark.—The bark of commerce, —that which is alone official in the British and Indian Pharmacopœias, is Ceylon cinnamon. In the United States Pharmacopœia both true Cinnamon bark and Cassia bark there mentioned as obtained from *Cinnamomum aromaticum*, Nees, (see *Cassia Bark*,) are official under the common name of cinnamon bark. The official cinnamon bark of the British Pharmacopœia consists essentially of the inner bark or *liber*, and presents the following characters:—It is in closely rolled quills, each being about $\frac{3}{8}$ of an inch in thickness and containing several smaller quills. The bark is thin, brittle, splintery, moderately pliable, of a dull, light yellowish-brown colour externally, and of a darker brown on its inner surface. The outer surface presents at varying distances little scars or holes indicating the points where the leaves have been removed, and is also marked with faint, shining, wavy lines. The odour is fragrant, and the taste warm, sweet, and aromatic. These are the characters of the best Ceylon cinnamon; inferior kinds are thicker, darker-brown, and have a pungent succeeded by a bitter taste. The means of distinguishing cinnamon from cassia bark, which is frequently substituted for it, are described under Cassia bark.

The essential constituent of cinnamon bark is the *volatile oil*, which is official in the British and Indian Pharmacopœias. It is also official in the United States Pharmacopœia; and although, as already noticed, no difference is there made between cinnamon and cassia barks, the volatile oil is directed to be derived from the bark of *Cinnamomum zeylanicum* alone. Oil of cinnamon is imported from Ceylon. When fresh it has a golden-yellow colour, but by keeping, owing to oxidation, it becomes contaminated with resin and cinnamic acid, and changes to cherry-red. Its sp. gr. is 1·1035; it has a pleasant and purely cinnamomic odour, and a sweetish cinnamomic and burning taste. Oil of cassia is sometimes substituted for or mixed with the finer and more costly oil of cinnamon.

Medical Properties and Uses.—Cinnamon bark has generally the properties of the spices, being aromatic, carminative, and stimulant. It is also somewhat astringent. It is rarely prescribed alone, but chiefly as an addition to other medicines, to improve their flavour or to check their griping qualities. As a cordial, stimulant, and tonic, it is indicated in all cases characterised by feebleness and atony. As an astringent it is employed in diarrhœa, usually in combination with chalk, the vegetable infusions, or opium. As a cordial and stimulant it is exhibited in the latter stages of low fever. In flatulent and spasmodic affections of the alimentary canal it often proves a very efficient carminative and antispasmodic. It checks nausea and vomiting. It has also been used in uterine hæmorrhage.

The oil of cinnamon possesses the cordial and carminative properties of the bark without its astringency, and is a good deal used as an adjunct to other medicines, and also as a powerful local stimulant in paralysis of the tongue, cramp of the stomach, and to relieve headache, &c.

The principal consumption of cinnamon is, however, as a spice, and we have already alluded to it as the chief flavouring agent for chocolate.

An oil of a clove-like odour and taste is also distilled from the leaves of the cinnamon plant in Ceylon, and occasionally

imported; and the substance called Cinnamon suet is also expressed in Ceylon from the ripe fruits.

Pharmacographia, p. 470; Per. Mat. Med., by B. & R., p. 541; U. S. Disp., by W. & B., pp. 312 and 595; Per. Mat. Med., vol. ii, pt. 1, pp. 439—441; Bentl., Man. Bot., p. 611.

DESCRIPTION OF PLATE.

Drawn from a specimen cultivated in the Royal Gardens, Kew; the fruit added from a specimen collected by Thwaites in Ceylon (n. 2284).

1. Young branch with flowers.
2. Diagram of flower.
3. Vertical section of flower.
4. An outer stamen.
5. An inner stamen.
6. A staminode.
7. Fruit.
8. Section of fruit.

(3—6 enlarged; 8 copied from Wight, l. c.)

D.Blair ad nat.del et lith

M&N Hanhart imp

DAPHNE MEZEREUM, *Linn*

N. Ord. THYMELACEÆ. Lindl., Veg. K., p. 530; Le Maout & Dec., p. 656; Baill., Hist. Pl., vi.

Genus Daphne,* *Linn.* Baill., Hist. Pl., vi, p. 133. Species about 40, natives of the northern half of the old world.

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225. Daphne Mezereum,† *Linn., Sp. Plan'., ed.* 1, *p.* 356 (1753).

Mezereon.

Syn.—Mezereum officinarum, *C. A. Meyer.*

Figures.—Woodville, t. 245; Hayne, iii, t. 43; Steph. & Ch., t. 65; Nees, t. 125; Berg & Sch., t. 126; Syme, E., Bot., viii, t. 1246; Reichenb., Ic. Fl., Germ., xi, t. 556; Nees, Gen. Fl. Germ.; Baill., l. c., figs. 81–85.

Description.—A small, slender, straggling shrub, from 1 to 4 feet in height, with an erect stem and few ascending branches covered with very smooth, silvery-grey bark and terminated by large buds, the young branchlets with a fine white tomentum; the bark becomes darker coloured on the root. Leaves deciduous, alternate, nearly sessile, spreading, 2—3 inches long, lanceolate, rather blunt, entire, smooth, dark green. Flowers in small clusters of 2 or 3, sessile on the branches of the previous year and produced from buds in the axils of the fallen leaves; a few small, ovate, smooth bracts at the base of the flowers. Perianth gamophyllous, tubular below, limb nearly ½ inch wide, spreading, deeply cleft into 4 ovate, acute or bluntish, imbricate segments, purplish-pink, darker and more red on the outside, tube finely hairy externally, smooth within. Stamens 8, inserted in two alternating rows just within the throat of the perianth-tube, filaments very short, anthers small, 2-celled, yellow. Ovary ovoid, tapering at both ends, about half as long as the perianth-tube within which it is quite enclosed though entirely free from it, one-celled, with a single pendulous anatropous ovule, style very short, stigma capitate. Fruit fleshy, ovoid, about ⅜ inch long, slightly pointed,

* The classical δάφνη, sacred to Apollo, is *Laurus nobilis*, L.; the name was given to this genus from the laurel-like foliage of some species.

† *Mezereum*, a mediæval name, altered from the Persian *Mazariyun*, which was applied to a species of *Daphne.*

sessile, bright red, pulp (epicarp) succulent, lined by a thin green skin (endocarp ?) closely surrounding the seed, and traversed by the orange-coloured raphe. Seed solitary, circular on section, but tapering at each end to a point, with a broad, shallow groove along one side, testa shining, dark purple brown, paler inside; inner coat very thin, yellow. Embryo large, spherical, with large plane-convex cotyledons, and a small exserted radicle; no endosperm.

Habitat.—The mezereon grows in hilly woods, ascending into sub-alpine districts throughout Europe, and is especially frequent in the central and eastern parts; in the west it is more scarce, and in England is decidedly rare, being met with chiefly in woods on chalk or limestone in the southern counties; in many of its localities it is considered to be an escape from gardens. The shrub reaches the arctic regions and extends eastward into Siberia.

The flowers are very fragrant and appear in March when the leaf-buds are just commencing to expand; they persist for some time and are succeeded by the handsome scarlet fruit which is ripe in July. By this time the terminal buds have developed into long shoots, and the "berries" appear placed some distance down the stem though the flowers were near its extremity; the crimson-coloured flower buds for the subsequent year are already present in or rather a little above the axils of the new leaves. There are varieties with white flowers and with yellow fruit.

By some authors the fruit is described as a drupe, the hard covering of the seed, above called the testa, being regarded as a stone or putamen.

Hook., f., Stud. Fl., p. 322; Syme, E., Bot., viii, p. 84; Watson, Comp. Cyb. Br., p. 305; Meisner, in DC. Prod., xiv, p. 530; Lindl., Fl. Med., p. 324; Ledebour, Fl. Ross., iii, p. 546.

Official Part and Names.—Mezerei Cortex; the dried bark of Daphne Mezereum, *Linn.* or of Daphne Laureola, *Linn.* (B.P.). The dried bark (*Mezereon Bark*) of the above plants (I. P.). Mezereum; the bark of Daphne Mezereum, and of Daphne Gnidium (U. S. P.).

In the London and Edinburgh Pharmacopœias, the only official Mezereon Bark before the issue of the British Pharmacopœia in

1864, was the root-bark of *Daphne Mezereum*. The stem-bark is usually regarded as somewhat less active than the root-bark, but in the Dublin Pharmacopœia, formerly, and in the United States and most of the Continental pharmacopœias, the bark of both root and stem was included under the common name of Mezereon; and now, in consequence of the impossibility of obtaining a sufficient supply of the root-bark, the bark of both root and stem is also made official in the British Pharmacopœia, and in the Pharmacopœia of India. The British Pharmacopœia now also allows the bark of *Daphne Laureola* to be used as well as that derived from *D. Mezereum;* and the Pharmacopœia of the United States likewise permits the bark of *Daphne Gnidium* to be employed indiscriminately with that of *D. Mezereum*. We shall subsequently figure and describe both *Daphne Laureola* and *D. Gnidium*.

Collection and Commerce.—Mezereon bark, or Mezereon as it is simply termed in the Pharmacopœia of the United States, is collected in the winter months, and after being dried, it is made up into rolls or bundles. Formerly it was collected for medicinal purposes in Kent and Hampshire; but at present it is mostly imported from Germany.

General Characters and Composition.—Mezereon bark occurs in more or less flattened strips and quilled pieces of various lengths; but rarely more than about $\frac{1}{20}$ of an inch thick. It is covered externally by an olive- or somewhat reddish-brown, corky, and readily separable layer; and is white, very tough, fibrous, and cottony, internally. The stem-bark is readily recognised from the root-bark, more especially when fresh, by the green colour of its cellular envelope or part beneath the outer corky layer. The bark of the younger branches is also marked by evident leaf-scars. When chewed, the taste of the root-bark is at first sweetish, but afterwards persistently burning and acrid; that of the stem-bark is somewhat less acrid. When fresh mezereon bark has an unpleasant odour, but this is nearly lost in the dried state.

Mezereon bark is said to owe its acridity to a *resin*, but this substance has never been thoroughly examined. According to

Squire, mezereon bark also contains an *acrid volatile oil.* He says, "the pungent odour given off by boiling mezereon root in water over a lamp is so powerful, that, after holding my head over it for a short time, great irritation was produced, and it was difficult to carry on respiration." A neutral non-volatile glucoside, which appears to be destitute of active properties, is another constituent of the bark; it has been termed *daphnin.*

Medical Properties and Uses.—Locally applied in a moistened state to the skin, mezereon bark will produce redness and even vesication, but its action is slow, generally requiring from twenty-four to forty-eight hours to raise a blister. It is, however, sometimes used in France as a vesicatory, as follows :—The bark is first softened by soaking it in hot vinegar and water, and then applied to the part by a compress and bandage; and the application renewed night and morning until vesication is produced. An ointment of the bark is likewise used to keep issues or blisters open. It is this rubefacient and vesicant property which has led to the introduction of an ethereal extract of the bark as an ingredient in the official compound liniment of mustard. As an internal remedy, it is stimulant, diaphoretic, and diuretic; in large doses it acts as an irritant, causing vomiting and purging. It has been given in chronic rheumatism, and in syphilitic, scrofulous, and cutaneous affections, but with doubtful results. It is but rarely given in this country except as an ingredient in the compound decoction of sarsaparilla.

Per. Mat. Med., vol. ii, pt. 1, p. 477; Per. Mat. Med., by B. & R., p. 566; Pharmacographia, p. 486; U. S. Disp., by W. & B., p. 560; Squire, in Pharm. Journ., vol. i, 1st ser., p. 395: Zwenger, in Annal. der Chem. und Pharm., vol. cxv, p. 1.

DESCRIPTION OF PLATE.

The flowering branch drawn from a specimen collected at High Wycombe, Bucks, by Mr. Hiern, flowering in March; the leaves and fruit from a plant in Chelsea Gardens. 1. A branch with flowers and leaf-buds. 2. A branch with fruit and developed leaves. 3. Vertical section of a flower. 4. Vertical section of ovary. 5. Fruit with half the pulp removed. 6. The same with the whole of the pulp removed. 7. A seed. 8. Vertical, and—9. Transverse section of the same. (3–9 enlarged.)

D.Blair, F.L.S. ad nat. del. et lith.

M & N Hanhart imp.

DAPHNE LAUREOLA, *Linn.*

N. Ord. THYMELACEÆ.
Genus Daphne, *Linn.*

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226. Daphne Laureola,* *Linn., Sp. Plant. ed.* 1, p. 357 (1753).

Spurge Laurel.

Figures.—Hayne, iii, t. 44; Nees, t. 126; Syme, E. Bot., viii, t. 1247 Hook. Curt. Fl. Lond., v, t. 206; Reich., Ic. Fl. Germ., xi, t. 555.

Description.—A small bushy shrub, 1—3 feet high, with ascending, slender, flexible branches; bark smooth, tough, yellowish grey; terminal buds large, quite glabrous. Leaves evergreen, alternate, rather closely placed towards the ends of the branches which are bare below, somewhat drooping, scarcely stalked, 3—5 inches long, narrowly obovate-lanceolate, bluntly pointed, attenuated below, entire, thick and leathery, perfectly smooth, bright green, paler and with a very prominent midrib beneath. Flowers very shortly stalked, 3—8 together, forming small umbellate clusters at the extremities of short, somewhat drooping peduncles, provided with several broad, blunt, overlapping, pale-green, concave bracts, and coming from the axils of the upper leaves of the previous year. Perianth not ½ inch long, about ¼ inch wide, pale yellowish green, the segments not half as long as the tube, smooth, otherwise as in *D. Mezereum.* Stamens and pistil as in the last, but style somewhat longer; anthers orange. Fruit about ½ inch long, ovoid, scarcely pointed, shortly stalked, nearly black, structure as in *D. Mezereum.*

Habitat.—This attractive little shrub is a native of England, occurring not unfrequently on hedgebanks and in woods and copses chiefly on a calcareous or clay soil in most of the counties south of Durham; in Scotland it is not considered to be spontaneous. It is very frequently planted in shrubberies for ornament, being one of the few shrubs which will grow under the drip of large trees. Abroad it is found throughout Western and Southern Europe,

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* *Laureola*, a mediæval name signifying a small laurel; from its foliage.

but does not reach N. Germany or Russia; it also occurs in the Azores, Algeria, and Asia Minor.

The peculiar green flowers appear in the winter and early spring from January to April, and have a pleasant scent; they are often polygamous, some male flowers being intermixed with the ordinary bisexual ones; the male flowers have the perianth-tube longer. The fruits are ripe in summer, by which time, in consequence of the growth of the shoot, they are some way down the stem.

Hook. f., Stud. Fl., p. 622; Syme, E. Bot., viii, p. 86; Watson, Comp. Cyb. Br., p. 304; Meisner, in DC. Prod., xiv, p. 539; Gren. & Godr., Fl. France, iii, p. 57; Lindl., Fl. Med., p. 324.

Official Part and Names.—Mezerei Cortex; the dried bark of Daphne Mezereum, *Linn.*, or of Daphne Laureola, *Linn.* (B. P.). The dried bark of the above plants (I. P.). It is not official in the Pharmacopœia of the United States, the bark of Daphne Gnidium being there substituted for it.

We have already noticed this bark in our article on "Daphne Mezereum," and also referred to the generally received opinion in regard to the comparative activity of the root-bark and stem-bark of that species. The same remarks also apply in this particular to the present species; but the bark generally of *Daphne Laureola* is commonly regarded as somewhat less acrid than that of *D. Mezereum*. Squire says that the "latter has decidedly the advantage, both in the degree and duration of the irritation produced on the mucous linings of the throat." The difficulty, however, of obtaining a sufficient supply of the true Mezereon bark led to that of *Daphne Laureola* being also made official in the British Pharmacopœia and the Pharmacopœia of India.

Collection, General Characters, and Composition.—This bark, which is commonly known as *Spurge Laurel* or *Wood Laurel bark*, should be collected for medicinal use between November and February. The stem-bark is that most commonly met with in commerce. It is either collected in this country, or imported from the Continent, and more especially from Germany; but at the present time nearly all the Mezereon bark in use in the

United Kingdom is derived from *Daphne Mezereum*. The bark of the Spurge Laurel corresponds essentially in its characters with that of the true mezereon plant already described; but the bark of the younger branches of its stem may be distinguished from that of the latter species by the absence of the leaf-scars which are so evident in it. The bark of *D. Laureola* has the same taste and odour as that of *D. Mezereum*, but, as already noticed, it is generally regarded as somewhat less acrid in taste, although its odour is said by Squire to be more marked than in it, especially when recently dried. Squire also states in reference to these two barks that "the inner bark of *Daphne Mezereum* is highly acrid, creating in the mouth and fauces a burning sensation, and, if swallowed, it affects the whole lining of the œsophagus and stomach in the same manner. With some individuals this sensation continues only a few hours, while others feel it as long as two days. In the case of *D. Laureola*, I remarked that this effect is followed by a profuse perspiration of the face, head, and neck, and that as soon as this was fairly produced, the heat in the œsophagus and stomach began to subside."

The chemical composition of this bark is doubtless analogous to that of the true Mezereon bark; this has been described under the head of *Daphne Mezereum*.

Medical Properties and Uses.—Similar to those of the bark of *Daphne Mezereum*, under which they are noticed. The leaves were formerly employed as an emmenagogue, but unless very carefully used they produce violent vomiting and purging. They, as well as the bark, have been employed to cause abortion.

Per. Mat. Med., vol. ii, pt. 1, p. 481; Pharmacographia, p. 487; Gerarde's Herball, by Johnson (1636), p. 1405; Miller's Gard. Dict., vol. i, pt. 2; Watts' Dict. Chem., vol. ii, p. 304; Squire, in Pharm. Jl., vol. i, ser. 1st, p. 397.

DESCRIPTION OF PLATE.

Drawn from a specimen collected in the Isle of Wight by Mr. Stratton; the fruit added from Nees. 1. Upper part of a branch with flowers. 2. Vertical section of flower. 3. Perianth laid open. 4. Vertical section of ovary. 5. Group of fruit. (2–4 enlarged.)

DAPHNE GNIDIUM, *Linn*

M&N Hanhart imp

N. Ord. THYMELACEÆ.
Genus Daphne, *Linn.*

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227. Daphne Gnidium,* *Linn., Sp. Plant., ed.* 1, *p.* 357 (1753).

Spurge Flax.

Syn.—D. paniculata, *Lam.*

Figures.—Hayne, iii, t. 45; Flora Græca, t. 356; Reichenb., Ic. Fl. Germ., xi, t. 553.

Description.—A small bush, about 2—5 feet high, with many slender, ascending, cylindrical branches; bark brownish or purplish grey, marked with small pale leaf-scars, slightly wrinkled. Leaves very numerous, alternate, crowded in the upper parts of the branches where they form a dense tuft, overlapping, ascending, persistent, sessile, 1—1½ inch long, linear- or narrowly oblong-lanceolate, gradually tapering at the base, rather suddenly narrowed into the sharp acuminate apex, entire, quite glabrous, thick, midrib prominent beneath. Flowers small, on short pedicels with which they articulate, arranged on the somewhat divaricate lax branches of several small panicles which terminate the stem and arise from the axils of the uppermost leaves which they considerably exceed in length; the whole forming a somewhat loose corymbose terminal inflorescence, branches covered with white down or silk, no bracts. Perianth about ⅛ inch long, densely downy outside, white, the divisions short; the rest as in *D. Laureola.* Fruit small, about ⅛ inch long, ovoid, slightly tapering, scarlet; structure that of the genus.

Habitat.—This species of Daphne is a frequent plant in the south of France, Spain, Portugal, and the western Mediterranean coasts and island, extending also to the Canaries and Madeira; eastward it reaches Greece, but is not found in Asia Minor. It grows in dry sunny situations, heaths and pine woods, producing its small scented flowers from July to September, being thus very

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* *Gnidium*, κνίδιος, native to Cnidos; a name given by Dioscorides to a small shrub, possibly the present one.

different in this respect to the early-flowering British species already described; the leaves are scarcely evergreen, but persist for some time on the plant.

It is occasionally cultivated in botanic gardens here, and appears to have been grown by Gerard in 1597 (see his Herball, p. 1217).

Meisner, in DC. Prod., xiv, p. 538; Gren. & Godr., Fl. France, iii, p. 60; Willk. & Lange, Prod. Fl. Hisp., i, p. 298.

Official Part and Name.—Mezereum; the bark of Daphne Mezereum, and of Daphne Gnidium (U. S. P.). It is not official in the British Pharmacopœia, or the Pharmacopœia of India, the bark of D. Laureola being in these volumes substituted for it.

In France the bark of *D. Gnidium* is also official, and under the name of *Ecorce de Garou* is used indiscriminately with that of *D. Mezereum*. The barks of *D. alpina*, of *D. Cneorum*, and of *D. Laureola* are also employed in France and Germany for the same purposes as those barks.

Collection, General Characters, and Composition.—The bark should be collected in the winter months, as already noticed with that of *D. Mezereum* and *D. Laureola*. The same remarks also apply in this plant as with them in reference to the comparative activity of the stem-bark and root-bark; the former is, however, that which is commonly in use. Squire, speaking generally of the species of Daphne, says, "the bark of the root is the most efficacious part of this class of plants; next in order the bark of the stems, the leaves, the woody parts of the stems and roots, and, lastly, the flowers."

In its general characters this kind of mezereon bark closely resembles the barks of *D. Mezereum* and *D. Laureola* already described under these respective heads; but it is commonly of a somewhat darker colour, and that of the younger stems and branches is marked with numerous, closely set, somewhat spirally arranged, whitish, leaf-scars. When the leaves are present, which is sometimes the case in the bark of commerce, the drug is readily distinguished, as these are very different in shape to those

of the other two species, being very narrow like those of the Flax plant; hence the common name of Spurge Flax which is applied to this species of Daphne.

Medical Properties and Uses.—Similar to those of *Daphne Mezereum* and *D. Laureola;* they are described under the former plant.

Gerarde's Herball, by Johnson (1636), p. 1403; Thomson's Lond. Disp., by Garrod (1852), p. 328; Christison's Disp., 2nd edit., p. 637; Pharmacographia, p. 487; Squire, in Pharm. Journ., ser. 1, vol. i, p. 395; U. S. Disp., by W. & B., p. 560.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected in the south of France.

1. A branch with flowers and fruit.
2. A flower.
3. Section of the same.
4, 5. Fruit.
6. A seed.
7. Section of the same.

(2, 3, 5–7 enlarged.)

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